TAMPEREEN TEKNILLINEN YLIOPISTO
TAMPERE UNIVERSITY OF TECHNOLOGY

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CREATING CUSTOMER VALUE WITH SELF-SERVICE ANALYTICS

Master of Science thesis

Examiner: Professor Nina Helander
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ABSTRACT

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Value from services is usually measured at the management level but the users work in the operational domain. The management is often too focused on the monetary tradeoff of buying a service and the value gained from using the service. Business users have different needs and value perception than the management. Analytics is often seen as too technical to be understood and the ideology is that technology is the enabler and the problem solver. The human and organization capabilities are not considered when planning a service as technology aspect is the priority. Analytics can be used to deliver customer value in multiple stages depending on the service providers capabilities. Self-service enables new ways to deliver and co-create value to and with the customer, so the customer can choose the most fitting service for themselves.

The research was conducted in two different parts. The first part is literature review where the theory backgrounds of relevant topics are introduced. The literature review chapters aim to define the ways that customer value can be defined and perceived. Analytics chapter introduces how analytics creates value and how the information assets can be managed through capabilities. Self-service chapter defines how to get people to adopt self-service technologies and the main reasons of using self-services i.e. the customer value in self-service compared to interpersonal service. The second part is the empirical research. The empirical part was conducted by series of surveys and group interviews to gain knowledge about how the case company approaches the future demands of the customer and their own ability to offer the services.

The results of the research are meant as an insightful way to rethink the process of creating customer value in the analytics domain. The process should start with identifying the needs of customers and the business problems. The business problems are tied to customer needs and into the processes. As the different parts are connected, measuring the effectiveness and dynamic development can be done. Choosing the correct technologies and tools is much simpler when the gap between the current state and the target state is identified and the organization's capabilities as assessed. The capabilities will evolve over time as the people develop their skills of utilizing technologies. Customer value is created by understanding the customer and offering solutions to the business problems of the customer.

TIIVISTELMÄ

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Avainsanat: Analytiikka, itsepalvelu, arvon luonti, asiakasarvo, liiketoiminta-analytiikka

Johto mittaa usein palveluiden arvon, vaikka palveluiden käyttö tapahtuu operatiivisella tasolla. Johto keskittyy usein palvelun arvon mittaamiseen rahallisissa hyödyissä eli kuinka paljon rahallisella panostuksella pystytään tuottamaan rahallista hyötyä. Liiketoiminnan käyttäjillä on usein erilaiset tarpeet ja erilainen näkemys palvelun tuottamasta arvosta kuin johdolla. Analytiikkaa pidetään vaikeasti ymmärrettävä teknologiana, joka auttaa ratkaisemaan liiketoimintaan liittyviä ongelmia. Organisaatioon ja ihmisiin liittyviä kyvykkyyksiä ei pidetä niin tärkeinä, koska teknologiaa pidetään avainasemassa. Analytiikan avulla pystytään luomaan arvoa usealla eri tasolla riippuen palveluntuottajan kyvykkyyksistä. Itsepalvelu mahdollistaa uusia tapoja luoda asiakasarvoa, jotta asiakas pystyy valitsemaan itselleen sopivimman palvelun.

Tutkimus toteutettiin kahdessa osassa. Ensimmäinen osa pitää sisällään kirjallisuuskatsauksen, missä tutkimuksen teoria esitetään lukijalle. Kirjallisuuskatsauksen ensimmäinen luku pyrkii tuomaan esiin, kuinka asiakasarvo voidaan määrittää ja kuinka asiakasarvoa pystytään tuottamaan eri asiakasarvon dimensioissa. Analytiikkakappale esittelee kuinka analytiikka luo arvoa ja kuinka tietovaroja pystytään johtamaan kyvykkyyksien avulla. Itsepalvelukappale kertoo, kuinka asiakkaat saadaan sitoutettua itsepalveluihin ja mitkä ovat pääsyyt itsepalveluiden hyödyntämiseen eli kuinka itsepalvelu tuottaa asiakasarvoa. Toinen osa tutkimusta on empiirinen tutkimus. Empiirisessä tutkimuksessa toteutettiin sarja kyselyitä ja ryhmähaastatteluja. Näistä pyrittiin saamaan tietoa, kuinka tutkittava yritys näkee tulevaisuuden asiakastarpeet ja kuinka tulevaisuudessa pystytään tuottamaan oikeanlaisia palveluita.

Tutkimustulokset on tarkoitettu informatiiviseksi tavaksi miettiä asiakasarvon luontia uudesta näkökulmasta. Prosessi tulee aloittaa selvittämällä asiakasvaatimukset ja millaisia liiketoimintaongelmia näiden vaatimusten ratkomiseen liittyy. Liiketoiminta ongelmat liitetään yhteen asiakastarpeiden ja prosessien kanssa. Liitettyjä osia pystytään hallitsemaan ja mittaamaan paremmin. Oikeiden teknologioiden valitseminen on huomattavasti helpompaa, kun tavoitteet, tavoitteisiin pääsemiseen liittyvät ongelmat ja yrityksen kyvykkyydet ovat tiedossa. Kyvykkyydet kehittyvät samalla, kun organisaatio kehittyy tarjoamiensa ratkaisujen myötä ja ihmisten kyky käyttää teknologioita kasvaa. Asiakasarvoa pystytään luomaan huomattavissa määrin tarjoamalla oikeanlaisia ratkaisuja asiakkaiden liiketoimintaan liittyvissä ongelmissa.

PREFACE

This thesis was done to the unnamed customer organization titled as company X. I am thankful for the opportunity to write a thesis about the final topic. The final topic was really interesting, and I have learnt a lot about the covered themes during the writing process. The original idea of the thesis was created together with CGI Finland and the company X but as the thesis progressed, the topic was modified based on the needs. The whole process took three intensive months from coming up with the subject to finalizing the thesis. I enjoyed visiting the Nordic countries during the process and taking a deep dive into how analytics could be leveraged in an industry that was new for me.

First of all, I want to thank my Professor Nina Helander for her advisory on the thesis topics and inspiring a positive attitude in me even when the schedule did not look very promising. Secondly, I want to thank all the people from CGI and company X for their advices and their help in gathering all the necessary material to finalize my thesis. I also want to thank my family for the emotional support and my friends who helped me to stay focused on the thesis and with the help of proof-reading this thesis.

Thank you to all the people I spent time with while studying in Tampere University of Technology for making the years spent there a lot of fun. I want to thank the clubs I have been part of in my time of studies and especially our lovely guild Man@ger for being the best guild of them all. I really did enjoy my time at the university.

Tampere, 21.11.2018

Joonas Tyrväinen

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LIST OF ABBREVIATIONS

B2B	Business-to-business
B2C	Business-to-consumer
BI	Business intelligence
BI&A	Business intelligence & analytics
CIT	Critical incident technique
DaaS	Data as a service
ERP	Enterprise resource planning
IT	Information technology
MVP	Minimum viable product
ROI	Return of investment
SST	Self-service technology
SSTs	Self-service technologies

1. INTRODUCTION

In this chapter, background of the research and the reasoning why the thesis topic is important, is introduced. After that the research problem, research questions and the objectives are presented. Next the limitations and the thesis scope are introduced and the reasoning behind the limitations and how they affect the research. Finally, the structure is shown.

1.1 Research background and motivation

In the fast-moving business environment, information is a key advantage and according to Holsapple et al. (2014) business intelligence & analytics is seen as the top priority for chief information officers. Insights about the measured topic should be known preferably before the actual event. IT and analytics skills include the skills and knowledge of managing and analyzing the information assets (Chen et al. 2012). Analytics in all its forms is a big part in creating competitive advantage. According to Chen et al. (2012) and Holsapple et al. (2014) even academic programs teaching analytics are growing in popularity. Using data, organization wide, has not been accessible before and the analytics processes have been led by the IT department but according to Gartner (2018) study in self-service, the business users will be creating more analysis than data scientists by 2019. The amount of non-technical users trying to benefit from analytics will become bigger than the small percentage of technical users if business analytics can be enabled.

The problem is that most users are non-technical and unable to produce the needed analysis. According to Nucleus research (2011) data, the return of investment (ROI) in analytics applications can exceed 1000% and the high ROI makes it a very attractive investment target. While analytics as an investment is attractive, according to LaCugna (2013) and Liebowitz (2011) the problem is adopting analytics in practice and managing the complex business processes. Organizations constantly try to challenge themselves in adopting the business analytics approach as the benefits of improving processes and outcomes through business analytics is proven (Liebowitz, 2011). The amount of data available is rising exponentially and most of it remains underused. In many cases, the data is collected but the benefit from it is low compared to available potential. If information management is led right, the gap between current state and the full potential can be narrowed.

Digitalization sets new standards for the customers and companies must address them if they wish to stay on top of the competition. Customers are becoming more demanding in terms of velocity, quality and amount of information they should be given. Quality of

decisions can be improved through analytics (Davenport & Harris, 2007; Kohavi et al. 2002) but utilizing data in decisions making process does not automatically mean that the decisions are good quality because the decision-making process of the organization affects the quality of decisions (Sharma et al. 2014). With self-service companies can utilize both the internal and external data to solve business problems through standardized methods (Delen & Demirkan 2013). Self-service offers capabilities to enhance decisions making by giving tools to create insight based on business needs (Truong & Dustdar 2009). Internal and external users both can leverage the data exploration in same ways even when considering that their business problems are different. All the parties can benefit when business analytics is enabled for non-technical users. Instead of limiting the access to data, the point is to create more transparency between the customer and the end-user.

Customer value is an indicator to measure what the products or services are worth to the customer according to their own subjective opinion. (Parasuraman, 1997; Zeithaml, 1987). Depending on the chosen value dimensions (Rintamäki, 2016) customer value can be measured as the customer's perceived preference of achieving the goal (Woodruff, 1997; Holbrook, 200). Positive customer value is generated when customer gains more benefits than expected and positive customer value is directly tied with customer satisfaction that eventually leads into customer loyalty (Sánchez-Fernández & Iniesta-Bonillo, 2007). Sánchez-Fernández et al. (2008) says that the decision of customer value creation is a strategic decision of how value is communicated and generated to the customers. Gallarza et al. (2011) has noticed that researching value has multiple problems that exist because value is contextual and according to Cronin et al. (2000) a time-elusive concept. Following best practices set by other organizations takes organization only so far. Being the company setting the standards and innovating new ways for creating customer value in the context of measured service or industry enables actual competitive advantage.

The way of how self-service analytics creates value is not widely studied subject. Analyzing value has to be done in the specific context that is self-service on this thesis. According to Ho & Ko (2008), Dabholkar (1996), Globerson & Maggard (1991) and Meuter et al. (2000) self-service has clear features that differentiate the self-service from traditional models and the same features act as value adding components. Howson et al. (2017) say that most business intelligence & analytics programs have been shifted from primary reporting to enabling business users to leverage self-service in more agile way. Enabling business users would be a huge benefit for most organizations but enabling self-service model in analytics efficiently is not as easy as enabling analytics that is strictly governed by analytics experts or IT department. Together business users and technical experts will be able to leverage the data for the actual business problems (Sharma et al. 2014). Purpose built platform is the base of advanced self-service solution because the data has to be modeled with the use case in mind. Business analytics and self-service aim to offer means to utilize the data assets and to refine the data through analytics value chain without the need of analytics professional (Kohavi et al. 2012).

1.2 Research problem, research questions and objectives

The research aims to give insight about how information assets can be used throughout the organization. The problem has two parts. First problem is how can the goals be defined, and the second problem is how to get to the goals that are set. The problem is not purely a technological problem and neither it is a business problem. Efficient use of business analytics through self-service requires both technological improvements and business management. Analytics must offer the platform for internal users of analytics that create the customer value for the customer but at the same time they should be able to leverage the information assets for better decision-making, and the external users comprise of both business-to-business (B2B) and business-to-customer (B2C) users that are trying develop their own business and improve their decision-making. The difference between internal and external users is clear and business analytics should be available for all the user profiles to fill the different needs of the different profiles. B2B customers are more likely to do their own analytics solutions that they can use but B2C customers are likely to have none. The internal and external users of analytics are treated as the customer in this thesis as all the customer profiles have to be taken into account. The different topics are tied to the value creation process. The analytics and self-service aspects are researched to get knowledge on how they can improve the communication and delivery of customer value in the future.

The primary research question is:

- How does self-service analytics create customer value?

Answering the primary research questions begins with defining and answering related sub research questions. The definitions of value, value creation and self-service analytics are the starting point to understand how the customer value is created by self-service analytics. The perception of customer value is subjective and contextual. Measuring the value requires that the context is known but assessing the preferred value dimensions of the customer will remain unclear and has to be analyzed for the best guess. Marketing correct services to the matching customer profiles can create value on its own. The role of business analytics and analytics capabilities for managing the information assets is gone through. The sum of analytics capabilities, analytics maturity, affects the service providers' ability to create customer value. The factors related to the primary questions must be answered to gain better insight:

- How is customer value perceived?
- What is the self-service analytics value chain?
- How does analytics maturity affect value creation capabilities?

The research questions will be answered by researching the topics in the literature review. The empirical part aims to gather the requirements on how the value should be created in

the future, so the correct value propositions can be created. Topics that literature review left unanswered are gone through in the empirical part and the empirical part adds some more detail into the specific case with company X. Primary research question is answered in the conclusion part of the research. The conclusion includes what could not be answered in the empirical part based on the literature review and all the theories are combined with the empirical results.

1.3 Research scope and limitations

The scope for this thesis is tailored for the needs of company X which is the organization that the thesis is made for. Company X offers variety of property asset management services in the Nordic countries. Nordic countries are very similar areas in term of how business is handled. The empirical study is conducted in Finland, Sweden, Norway and Denmark so the results must be generalized in some level to be able to come up with a centralized solution to support the needs of all the countries. The chosen solution should be flexible enough, so country specific needs can be implemented. Technical side won't be in the focus of this thesis because the initial problem of assessing the self-service analytics value creation potential is not tied to a single technical solution. Analytics and business intelligence will be treated as different terms in this thesis. Business intelligence is treated as umbrella term and analytics is included under the term business intelligence. In addition to analytics, the whole infrastructure, applications and tools to access and analyze data and information are included under the term business intelligence.

Revenue models will be left out of the thesis scope. Customer value can be perceived in multiple ways and it is the focus of this thesis to research what kind of value self-service creates and how to create customer value with self-service analytics. The possibilities that the thesis introduces are long-term objectives and require time to implement and adapt. Organizational changes and the changes in the services cannot be implemented overnight, so the timeframe to implement the needed solution should be taken into account in the conclusions.

The biggest limitation is that the self-service analytics solution does not exist yet so everything about the to-be solution is conceptual. This limits how the empirical study can be conducted and what kind of results can be expected from this thesis. The results are implications of how the value could be created and communicated in the estimated context. As the specific research focused on the self-service analytics is limited, the theory and the results must be generalized in some level. The results will also be conceptual and the future research following this research are important in order to do the assessment of value creation in the correct context. The timeframe where the thesis was done shifts some research into future research.

1.4 Research structure

This research consists of literature review and empirical research. Literature review is the theory background when analyzing the empirical research. Combining theory and empirical part will be combined in conclusion and the guidelines will be introduced to what the case solution is based on. The thesis will follow structure visualized in the figure 1.

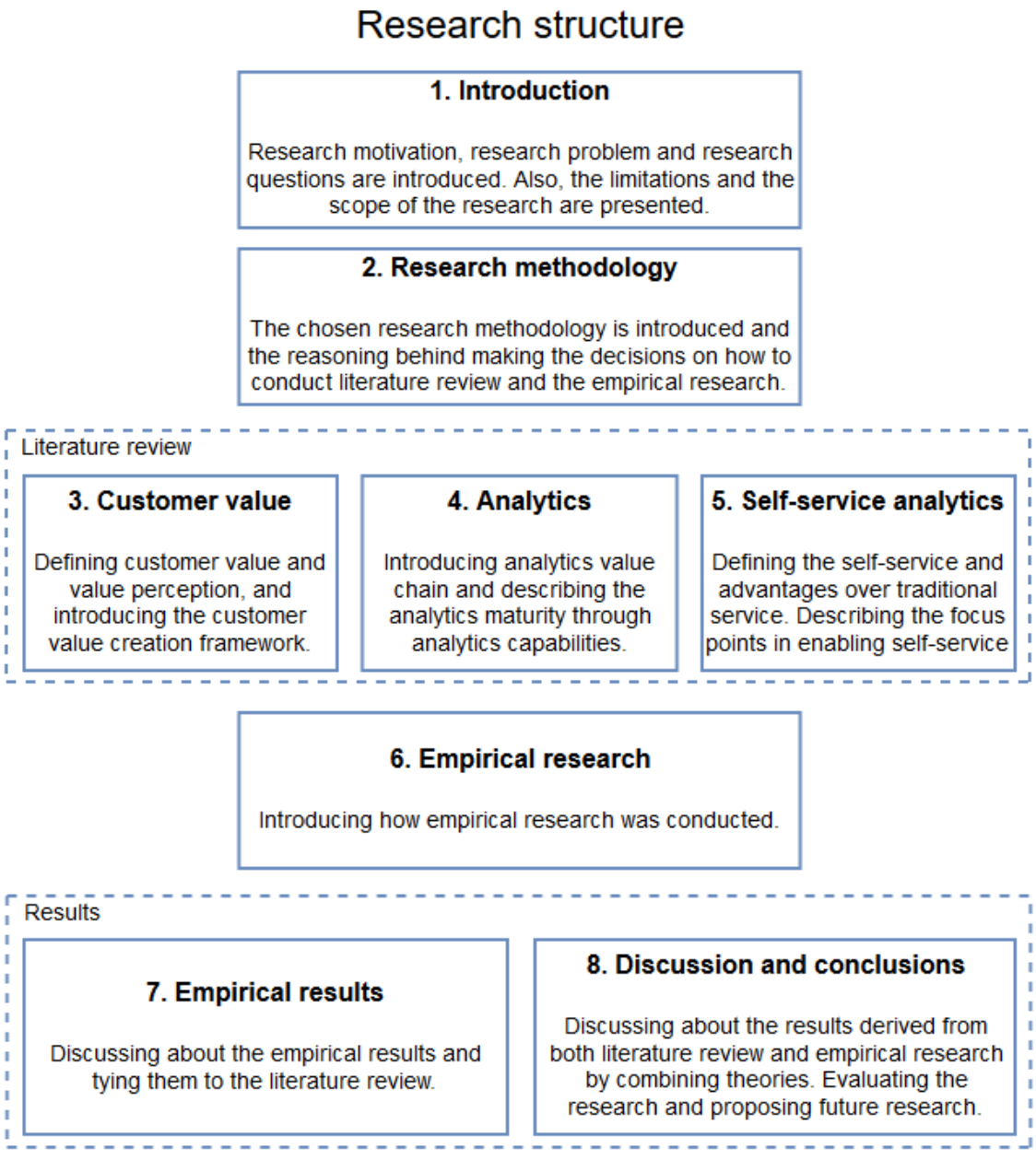

Figure 1. Thesis structure

Introduction will give the reader reasoning behind why the research is important. Research questions are included into the introduction and the research aims to answer the research question to solve the primary research question. The scope and limitations answers to what will be included in the thesis and why some parts are left out of the scope. Research methodology is summary of the method and how the materials for the literature

review and empirical study were obtained and used. Research methodology introduces how the research is built and what methods are used to gather and analyze the data.

Chapters three to five are the literature review. Each of the chapters in literature review has one main topic. Topics are customer value, analytics and self-service. The literature review tries to stay timely but in order to understand the concept of customer value and self-service, the concept is explained starting from further in the past and explanations can be quite older than what the analytics related definitions and explanations are. First chapter of literature review chapters start with defining the terms and introducing the concept of value, value perception and customer value. The analytics chapter aims to explain the role of technological and organizational capabilities in creating, communicating and delivering customer value. Fifth and final literature review chapters defines self-service technology and the main focus of customer adaptation to self-service as well as the self-service specific concerns. The literature review does not introduce any results, but the results are derived from the theoretical frameworks and definitions introduced in the literature review.

Sixth chapter explains how the empirical study was conducted. The process includes survey and interviews that were conducted with the same participants. The methods for analyzing the empirical results are introduced in the chapter six. In chapter seven the empirical results are gone through using the methods introduced in the previous chapter. Final chapter combines literature review topics and empirical results for the discussion and conclusion. In addition to answering the research questions, the critical review is discussed to understand what has to be taken into account when reading this thesis and evaluating the results, and final part where the future research needs are introduced. As the research topic is conceptual, the future research introduces guidelines how to assess the value creation capabilities in the future.

2. RESEARCH METHODOLOGY

In this chapter the methodologies used in the research are introduced. First the methodology is introduced. The reasoning why and how the literature review was conducted is gone through. The process of validating the references is gone through as the timeliness was important on some of the topics of this research. The method for conducting the surveys, workshops and the interviews, and the analysis methods for analyzing the surveys and the interviews is undergone in order to understand how the results of the empirical research are obtained.

2.1 Methodology

The research methodology is based on the research onion introduced by Saunders et al. (2009). The research onion represents the methodology in the form on onion. Each layer holds a choice made by the researcher about methods and techniques that are to be used in the research. The onion consists of six layers. Each layer the researcher "peels" off the onion gives more insight about how the research will be conducted. The research onion should be approached by making the outmost choice first by peeling (i.e. doing the choice) the onion and then moving to the next layer to make the next choice. Together each choice creates the final design of the research. The research onion and the chosen methodologies are presented in figure 2.

Figure 2. Chosen research method (modified from Saunder et al. 2009)

Some of the choices were based on the needs of company X. The point is that all the layers of the research onion have to fit together and as some of the decisions were made before starting the research, rest of the choices have to be fitted to get a suitable research as a whole. The premade choices come from how the empirical study was conducted and the premade choices were research strategy, research choice, time horizon, and techniques and procedures.

The research topics are highly contextual and subjective so interpretivism was chosen as the research philosophy. In interpretivism the differences are explained by differences of humans in interpreting the subject (Saunders et al. 2009) and the situation had to be interpreted by the researcher. Research approach was inductive as there was no way to test the theory in testable premises because the service is conceptual. Inductive research is based on observations that are generalized (Saunders et al. 2009). Each of the topics is highly researched but there are not many researches that would combine the research

topics and so there is need to generalize both the results of literature review and the empirical research.

Case study was chosen as the research strategy to fit the research topics and the results for the case company. The empirical research was based on the answers of company X employees. Case study focuses the attention to the important topic (Yin, 2003). The main idea was to get more knowledge on the topic that company X should focus into, to create more value for their customers. Case study enables the focus on a certain context (Saunders et al. 2009) and since the research was highly context dependent and conceptual, the case study was the correct choice.

The chosen time horizon was cross-sectional because the focus was to get better insight on what the state of the topics is at the moment. Because the research is focused on one particular time, the horizon is cross-sectional (Saunders et al. 2009). The other choice would be longitudinal, but it focuses on development over time. Analytics is developing so fast that the research must be focused on the present time to get the most relevant conclusions.

The innermost layer presents the research's data collection technique. Data was collected by literature review that is the whole theory part of the research and empirical data was collected through surveys and interviews. Surveys were all open questions and the group interviews were semi-structured that are common qualitative collecting methods (Saunders et al. 2009). Chosen data gathering methods were qualitative as well as the analysis methods. The number of participants in both was low and the type of the answer was not restricted as all the questions were open questions. The chosen method was mono-method since collecting the data and analyzing the data all used qualitative methods (Saunders et al. 2009).

2.2 Literature review

Literature review was chosen as part of the thesis in order to get more insight about the current state of the researched topic. Digitalization accelerates the changes in analytics as analytics is emerging as one of the most prominent technologies to invest in (Holsapple et al. 2014). According to Saunders et al. (2009) the literature review has two main reasons to be conducted. First the literature review will help researcher get better understanding on the topic and helps the researched to come up with better research ideas and questions. The second benefit of literature review is that the researcher gets more knowledge about the topic and better understanding how the research topic is positioned in a bigger picture. (Saunders et al. 2009). Both of these points raised by Saunders et al. are helping to make the most out of the research. Analytics is a widely researched topic but self-service in the analytics context is not so commonly researched topic.

Searching the articles was conducted by using the terms in the main titles of the theory chapters which are “customer value”, “analytics” and “self-service analytics.” The starting point in searching the articles was quite general and the searches were more specific after looking into the publication found with the initial search terms. The sources consist of both academic research and market research. Tampere University of Technology provides access to databases such as Andor and Scopus. Market research was provided by CGI and the used references included researches by Gartner. Market research material was used to cover very specific topics or very timely topics that have no peer reviewed academic research yet. Going through the material gives better understanding about the linked topics and possibilities for chapter subtopics. Using references of the materials and searching for Master of Science thesis about similar topics gives fresh ideas for better search terms for more specific results. Also, some of the researchers rose consistently in almost all the research of some topic and so the researcher’s other articles were searched in the databases. Most useful search terms were the exact words used in academic research. Some of the search terms that were used to find the initial articles, are listed in table 1:

Table 1. Search terms

Search term
“Customer value”
“Value perception”
“Value co-creation”
“Business analytics”
“Analytics” AND “self-service”

The requirements for accepting academic research was much tighter than for market research. The year of release filter was the most important when searching for material about analytics or business intelligence. The goal was to find as new research as possible, but the research of value and self-service is still widely based on same the research articles that are over twenty years old. For this reason, some older material was accepted for the topics of self-service and customer value. Article language was filtered to English only. Final requirement was that the article has been peer reviewed. These filters were used to make sure that the references for the thesis are of high quality and timely enough for the research goals. The market research evaluation was based on the research’s opinion together with what the academic research has forecasted.

The final choice of what market research to include in the thesis was based on the researcher’s evaluation. The articles are cross-referenced with each other, so the research has the support of theory to make conclusions. Of course, the opposing views that are justified, are not excluded because of the viewpoint but rather to support the research considerations and limitations. Some ideas and topics rose into more important position after starting the research and they were chosen as part of the research. Also, the points

raised by Saunders et al. (2009) about the literature review were correct since the research got new search terms as the knowledge about the research topic got higher. The search for new references lasted for the whole research. In the same time the references found earlier, took more important position for the research. The research did not get any new main topics during the process, but the topics were modified in order to make them fit together better and to be more consistent with the preferred form of results. The early draft of possible conclusions gave the last push to get everything necessary to fit into the literature review.

2.3 Empirical research

The chosen methodology guides the style of the empirical part of the thesis. Partly the methods were chosen based on what had been agreed with the company X about how the results could be gathered. The chosen research methods were surveys and semi-structured group interviews. Each survey was done before the matching group interview to make sure that the participants have general knowledge about the topic and they are ready to further discuss the future needs. Based on the survey results, mostly the same participants are then interviewed face-to-face in groups. Interview question are based on the themes that were already brought up is the surveys. Survey was also a tool to make sure that the participants familiarize themselves about the form of the desired outcomes of the group interview. The interviewees are chosen based on their relation to the business intelligence and analytics, but their day-to-day focus of the whole research topic might be quite narrow. Some were more technical working in the IT, while others were on the customer value creation side in the business units. For the interviews to be successful, the interviewees should be comfortable with the topic and the questions for the best results. Semi-structured interview enables going with the flow with every interviewee. Since there are interviewees from four different countries with currently four different strategies, the flexibility in the group interview questions is important. Survey questions are represented in the appendixes A, B, C, D and E, and the interviews used the same questions as the baseline of semi-structured group interview when going through the survey answers. While going through the answers, the questions were also gone through again to make sure they had been understood correctly and the answers were for the intended question. The target state of analytics capabilities was done separately from the group interviews and it is presented in the appendix F.

The reliability of the results is discussable. The results might be sugarcoated to make it look like that the current state is much closer to the target state than it actually is. The participant might be uncomfortable having to answer questions about their own performance which is compared to how other countries are performing or the ideas about the future are not so fine as someone else's. Also, the interviewee and the interviewer are biased based on their own experience and how they would like to see the future solution and how well the technologies are known by the people answering. All of the interviews

conducted, were group interviews. Having multiple people from multiple countries and multiple positions might affect the way people bring things up in a discussion. Face-to-face discussion enables interviewer to see all the facial expressions to get more in-depth assessment of what goes through the interviewees mind.

Analyzing answers from all four countries is not an easy task because the answers might be valid even though they are different. Validity of the answers must be assessed but luckily the survey answers were validated on some level at the group interviews. Having the group interview after the survey is a chance to make sure that the survey answers are interpreted right by the interviewer. Misinterpretation of what the interviewee has meant might lead into problems in the summary and validation as outliers from otherwise legit answers. The amount of answers to the survey and the number of interviewees is low as each country only provides one set of answers to each survey so each of the answers represents big part of the whole volume. In qualitative study, single opinion might prevent the otherwise uniform opinion for the summary. Having opposing opinions is important for the research's aspect and it sparks good discussion in the group interviews. The group interviews held, eased this burden because the differences between countries was discussed to find a common understanding of the requirements for the future solution.

Summarizing method extracts the key points to understand they main themes (Saunders et al. 2009). It is important to extract the most interesting points to follow the ideology of exploratory research. The follow-up interviews enable the researcher to discuss the main topics even further and get in-depth analysis of the topics left unanswered. The goals of what should the future solution be able to deliver, were risen from the set of smaller requirements. These goals are the way to make sure that all the different customers segments can be served through the portfolio of what the company X is capable of delivering.

3. CUSTOMER VALUE

This chapter introduces the definition of customer value and how do different people perceive value. The definition of value is broken down into different value dimensions. The goal is to understand how different customer perception can differentiate the customers. Finally, the value co-creation aspect is gone through in order to understand how value co-creation is defined.

3.1 Defining customer value

The concept of customer value is critical to understand in order to be able to answer the primary research question. Zeithaml (1988) defines customer value (from the customer's perspective) as the relative tradeoff between what they "get" and what they have to "give up." Customer value is the purpose of organization (Slater 1997), main key to success (Cooper, 2001), and key to customer satisfaction (Woodall, 2003; Coelho & Henseler, 2012). Customer value has many definitions based on what the goal is. The definition of Slater (1997) where creating customer value is the sole purpose of organization, is a bold expression but the role of organization from customer's perspective is to create value or the customer will choose another service provider. When discussing about a service, creating continuous value is a key element of creating customer loyalty. The awareness of creating and delivering superior customer value has increased (Wang et al. 2004; Smith & Colgate, 2007) instead of focusing on narrower scope of strategic management or customer satisfaction (Sánchez-Fernández et al. 2009). Depending of the area of focus, the perspective of value creation is different.

For the purpose of this thesis, customer value as a concept is defined by combining multiple definitions into understandable framework that suits the context of the empirical research. Woodruff (1997) defines customer value as: "a customer's perceived preference for, and evaluation of, those product attributes, attribute performances, and consequences arising from use that facilitates (or blocks) achieving the customer's goals and purposes in use situation." Holbrook (2006) on the other hand defines customer value as "interactive, relativistic preference and experience." Both definitions of customer value are hard to apply, and they are intended to understand key characteristics (Smith & Colgate, 2007). The problem is that customers perceive the value different way and there is no clear definition if the customer value is the sum of benefits and sacrifices or ratio of benefits and sacrifices (Parasuraman, 1997). Instead of defining what customer value means (for some customer) this thesis tries to find the suitable framework to measure some of the dimensions affecting the customer value. Trying to measure exact value created by the service is not useful because finding the weights of the features are not consistent. For this reason,

the value-based customer segmentation can be utilized to gain more insight about the different needs of different customer segments.

Sánchez-Fernández et al. (2009) says that even though there is no universally accepted definition for the term customer value, the customer value can still be understood and measured in specific context. The lack of a single definition is irrelevant to get results and development on customer value. This thesis aims to create a framework that can be used in the context of analytics service. Data, information or analytics as a service, and the value creating elements are not so widely researched as customer value in retail for example. Value as a concept is a multidimensional structure with psychometric properties (Sánchez-Fernández et al. 2009). Having multiple dimensions when measuring customer value enables more accurate results. The psychometric properties can take be analyzed statistically to adjust the weight of each property. The problems of value related research observed by Gallarza et al. (2011), are visualized in figure 3:

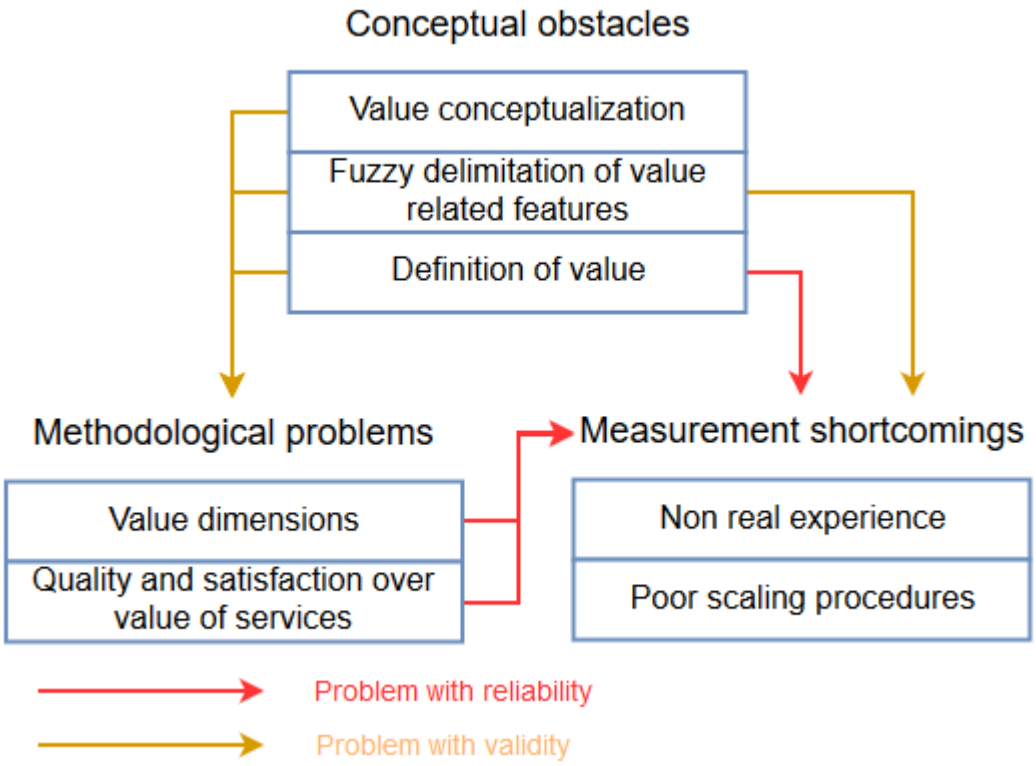

Figure 3. Difficulties in value research (modified from Gallarza et al. 2011)

The conceptual and contextual obstacles in the research affect the validity of methodological problems. Value is conceptual, and delimitation is fuzzy because there are no universally accepted definitions of features affecting how to measure value. Definition of value and the features affecting value also affect the measurement which means that measuring the non-existent service cannot be effectively measured. Methodological problems in choosing the dimensions to measure the value and lack of customer value creation

research in services will limit the measurement possibilities in both validity and reliability of the measurements.

Customer value can occur in different stages of the service. Depending on how the value creation process is seen, the customer value grows as effort is put into the process or the value occurs when the created value is used in the very end of the process. (Grönroos, 2011). Production is generating the potential value while usage is the generation of the real value (Gummesson, 2007; Vargo & Lusch, 2011). In the context of this thesis, creating the service offering is creating the potential value and customers using these services generates value. This leads into initial calculation of what the customer value of chosen service might be and the real value can be measured once the conceptual service can be evaluated with real experiences.

Positive created customer value leads into customer satisfaction which leads into customer loyalty (Woodall, 2003; Coelho & Henseler, 2012; Khalifa, 2004). The point of creating customer value through a service is to influence the customer value perception and to attain customer loyalty with the service as it has replaced some of the interpersonal service. The concept of customer value stretches from the marketing activity all the way to the service delivery (Holbrook 1999) and the value of using the service where the customer value is finally generated (Gummesson, 2007; Vargo & Lusch, 2011). Customer satisfaction and through that, the customer loyalty is the goal of measuring and developing the customer value.

3.2 Customer value perception

Measuring customer value in a service offering, the value creating elements can be different compared to a product (Sánchez-Fernández et al. 2009). The value creating activities for the service offering can include identifiable aspects (Levenburg, 2005). In this thesis customer value is considered as a multidimensional construct where multiple dimensions create value separately and simultaneously (Sheth et al. 1991; Park et al, 1986; Woodall, 2003; Rintamäki, 2016). The single dimension approach has been widely used but argued to be too simple to accurately reflect the customer value concept (de Ruyter et al. 1997; Mathwick et al. 2001; Sweeney & Soutar 2001). Multidimensional approach is chosen because of the goal what the thesis is trying to achieve. Customer value is used to separate the different customer needs in terms of what kind of value should be created based on the customers estimated value perception. Single dimension is not enough to differentiate the customer to map the customer value perception and the analytics offerings.

Perceived value is often poorly differentiated from the related constructs such as value, utility or price and the relationships of these constructs remain unclear (Lapierre et al. 1999). According to Holbrook (1999) the term ‘value’ means outcome of an evaluative judgment. Again, the meaning value is discussed amongst different researchers just like

customer value and there is no universally accepted definition. The term ‘values’ on the other hand is set of standards, rules, criteria, norms, goals, and ideals that are the base of the evaluative judgment how value is perceived (Holbrook 1999).

Combining the definitions of Zeithaml (1987), Woodruff (1997), Parasuraman (1997) and Holbrook (1994, 1999, 2005) we can visualize the customer value concept on a high level in figure 4:

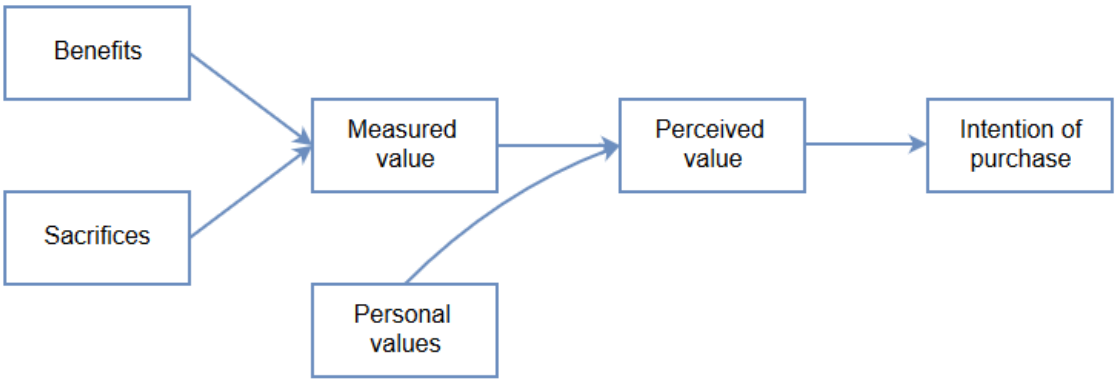

Figure 4. Customer value perception

Figure 4 describes how the generated customer value defines the intention of purchase. Using the definition of value by Parasuraman (1997) and Zeithaml (1987), a subjective tradeoff between benefits and sacrifices can be measured and marketed to the customers. The personal values of the customer, together with the value, create the final value perception (Woodruff, 1997; Holbrook, 1994, 1999, 2006) after the actual value is generated in usage. The perceived value compared to the measured and marketed value creates either positive or negative experience that defines if the customer is willing to make the purchase.

Building customer loyalty through enhancing customer value perception is a way to build protection from competition and control in planning (Kotler, 2003). The idea of defining and measuring customer value, is to use the results and to benefit from them. Customer loyalty is usually associated with a brand (Mascarenhas et al. 2006). Oliver (1999) defines brand loyalty as commitment to re-buy the preferred service consistently in the future despite situational influence. The problematic part is to keep the customer value consistently high enough to keep customers committed long enough to create loyalty relationship.

Misunderstanding the customer value perception is critical factor in the service industry (Cronin et al. 2000; Chen & Dubinsky 2003). Transferring from exchange to value creation based, changes the market. Value is now created inside the organization and the created value is then exchanged with the customer (Prahalad & Ramaswamy, 2004). In value co-creation the value is created together with the customer.

Customer value perception is the center of focus in value creation (Cronin et al. 2000; Chen & Dubinsky 2003) but also time elusive as a concept (Cronin et al 2000). Creating sustainable competitive advantage is dependent on the ability to create continuous customer value (Sánchez-Fernández & Iniesta-Bonillo, 2007). Since the terminology is on the conceptual level and all the definitions are highly subjective, personal, and context-dependent, there is a lot of confusion around value (Rust & Oliver,1994; Zeithaml, 1988). There is a difference between customer value and customer value perception (Zeithaml, 1988) since perception changes based on the subjective relationship to the dimensions of value is constructed.

Assessing the managerial implications of how customers perceive value might create new opportunities, ways of communication and changes to service delivery strategy (Sánchez-Fernández et al. 2008). The implications should be based on real research on a real service since according to Gallarza et al. (2011) the use of non-real experiences and secondary data will lead into shortcomings in measuring value. Since the empirical study is conceptual, the actual measurement and comparison to competitors must be done when the real service is available.

3.3 Customer value framework

Structure of customer value determines the customer value dimensions and the relationships between different dimensions (Zeithaml, 1988; Woodruff, 1997). Customer value is structured in the form of framework to help evaluate and measure customer value. Khalifa (2004) divides the different structures of customer value into three different models value component models, benefit/cost ratio models and means-end models. According to Rintamäki (2016) the means-end model represents the widest framework where different models can be brought together.

Park et al. (1986) has described three value dimensions that sum the consumer needs. According to Park et al. they are functional, symbolic, and experiential needs. However, there is no indicator for the trade-off between benefits and sacrifices as the customer value definition suggests (Smith & Colgate, 2007). Park et al. (1986) describes the different value dimensions as functional, symbolic and experiential. Five value perspectives according to Sheth et al. (1991) are functional, emotional, epistemic, social, and conditional value. The model by Sheth et al. is based on products' ability to create value. Woodall (2003) has identified five different dimensions of customer value which are net, sale, derived, rational and marketing. As the different models have different dimensions and the focus in one model might be much narrower than in another, the dimensions have been defined in different ways. The definitions between different models will overlap with other models in terms of what is included in a single dimension. For this reason, a wide structure, a wide model and easy to understand definitions for each dimension are used in this thesis.

For the purpose of this thesis the Rintamäki's (2016) value dimensions and Holbrook's (1994, 1999) customer value typology are combined into a single framework. Rintamäki has identified four different dimensions that affect the customer value. The dimensions are economic, emotional, functional, and symbolic values. Holbrook has divided his topology into three deciding factors between two choices that are active-reactive, extrinsic-intrinsic and self-other -oriented. From Holbrook's typology the decisions are created to understand the customer and Rintamäki's dimensions are used to simplify the customer value perception. Figure 5 represents the Holbrook's customer value topology:

		Extrinsic	Intrinsic
Self-oriented	Active	**Efficiency** Output/input, convenience	**Play** Fun
	Reactive	**Excellence** Quality	**Aesthetic** Beauty
Other-oriented	Active	**Status** Success, Impression, Management	**Ethics** Justice, Virtue, Morality
	Reactive	**Esteem** Reputation,Materialism,Possession	**Spirituality** Faith, Ecstasy, Sacredness, Magic

Figure 5. Customer value typology (modified from Holbrook, 1994, 1999)

If the choices of Holbrook's (1994, 1999) topology are left out and the terminology is changed to match with Rintamäki's (2016) terminology of dimensions, the same features are presented in more simple way, the customer value can be divided as it is presented in the figure 6:

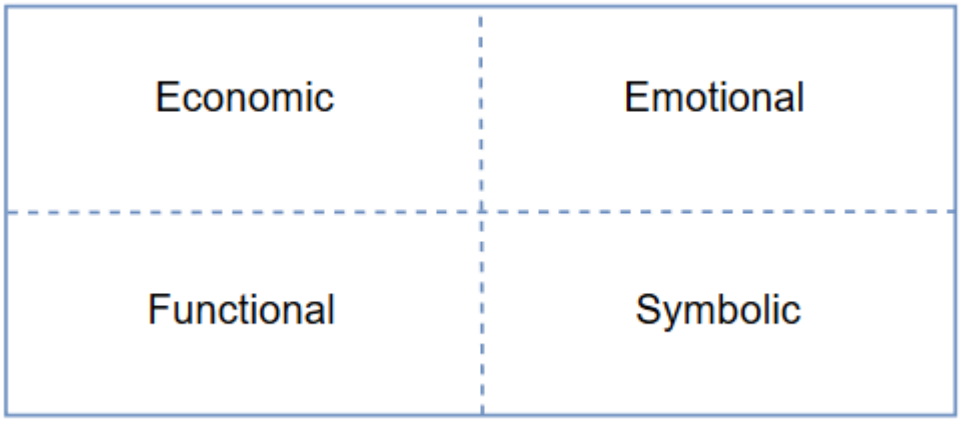

Figure 6. Customer value dimensions (modified from Rintamäki, 2016)

Economic value

Economic value dimensions are extrinsic and self-oriented in the Holbrook's (1999) typology. It measures the efficiency and excellence as the active and reactive value

(Holbrook, 1994, 1999). Woodall (2003) defines sale customer value as the reduction in sacrifice and the derived customer value as the outcome whereas the rational customer value is the relative comparison of benefits and sacrifices. As economic value is basically the perceived tradeoff between monetary and non-monetary costs and risks related to using, owning and purchasing (Smith & Colgate, 2007).

The economic value is usually tied to monetary value. In the context of service and analytics, the value that customers try to create with the analytics service might be non-monetary, but the goal is to turn the non-monetary goals into monetary value. Customers can co-create economic value with their own participation in three ways: service quality, customized service, and increased control (Mills 1986). Self-service and co-creation give the customer the ability to affect the value that the service provider can create.

Emotional value

Emotional value describes the feeling that customer has when they experience the service (Sheth et al. 1991). In the Holbrook's (1994, 1999) typology, emotional value represents play and aesthetic values. Smith & Colgate (2007) define experiential/hedonic value as the ability to create appropriate feelings, emotions and experiences when using a product. Park et al. (1986) defines experiential value as ability to fill sensory pleasure, variety of cognitive stimulation. For this thesis the Smith & Colgate (2007) and Park et al. (1986) definitions of experiential/hedonic value is included under the term emotional value.

Emotional value creation can be summarized around the word appropriate. Positive feelings, emotions and experiences create positive value. They can be part of how the product looks or if it is fun to use as Holbrook (1994, 1999) typology divides the active and reactive values. One way to create emotional value is to be visually more desirable for the user than competition.

Functional value

Sheth et al. (1991) defines functional value as the perceived utility gained compared to alternatives. Functional value represents the ability to perform the given purpose (Park et al. 1986; Sheth et al. 1991; Smith & Colgate, 2007) and Smith & Colgate (2007) amplifies this definition by adding to what extent the product has desired characteristics. In Holbrook's (1994, 1999) typology the functional value is created by status and esteem. Epistemic value is the products' ability to satisfy desire for knowledge (Sheth, 1991). The epistemic value is included into the functional value in this thesis as it is part of the functions that the product should be capable of satisfying.

Woodall (2003) defines marketing customer value as the perceived product attributes. Many companies drive customized strategy to create customer specific content in their services (Huffman & Kahn, 1998). According to Murthy & Sarkar (2003), creating cus-

tomized content does not automatically benefit the customer because in many cases customers do not have predefined preferences. The functional value is about what the customer expects the product to be able to do. The value communicated through marketing the product should match the customer perception of the value.

Symbolic value

Symbolic need is generated internally for the chosen product to fulfill (Park et al. 1986). Social value is the image and symbolism associated with the product. Social and conditional value are limited to specific groups and specific situations. (Sheth et al. 1991). Holbrook's (1994, 1999) typology measures symbolic value as ethics and spirituality. According to Holbrook, symbolic value is intrinsic and self-oriented. Smith & Colgate (2007) define symbolic/expressive value as how customer associates the product with psychological meanings.

Rintamäki (2016) introduces an integrative framework to manage customer value. In order to be effective in creating customer value, it must be managed. Rintamäki's (2016) customer value management model is cyclic and iterative process cycle where the different perspectives and different focus points are taken into account when assessing and developing the customer value propositions offered by the organization. The customer value management model is presented in figure 7:

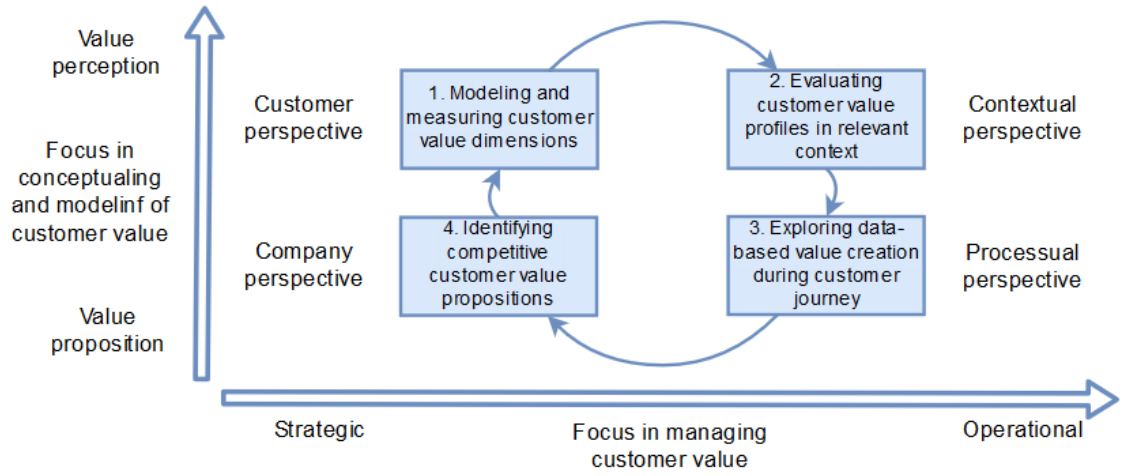

Figure 7. Customer value management framework (modified from Rintamäki, 2016)

The process cycle starts from strategic value perception perspective. The aim for this first step is to model and measure the value dimensions. Second step is on the operational side to gain knowledge about the customer profiles. This means profiling and segmenting the customers in the context of the service. Third step is on the value proposition side instead of value perception. The process to explore modeled customer value and the customer profiles during the different stages of their customer journey to gain insight on what kind of services are needed. Final step is again on the strategic side. Identifying what kind of

changes are needed in order to improve or renew the value propositions in the organization's portfolio.

3.4 Value co-creation

For the co-creation to be effective, is to have higher desire of actors to co-create value than the need for exchange. (Mascarenhas et al. 2006). Ennew & Blinks (1999) suggest that customer will participate to value co-creation if it benefits them. The prerequisites for co-creation suggest that the perceived value of co-creation must be higher than traditional exchange. Chan (2010) says that the shift of power from employees and service professionals to customer is value co-creation key point. Shifting the power more to the customer side also shifts the workload and stress to the customer (Chan et al. 2010). Because of the nature of value creation model and the fact that customer creates a part of the value in co-creation, the effort must be beneficial for the customer. Value co-creation comes down to the same question that what is the customer value in the co-creation as customer has to co-create value for the service provider in the service provider's value chain.

According to Vargo & Lusch (2004), the customer is always value co-creator and in the Vargo & Lusch (2008) re-formulation of customer being co-creator is accepted in almost all service-dominant logic researches. The position of customer can be discussed if the customer is co-creating value or co-creator of value. The definitions of co-creating value and co-creator of value are clear. While both do create value, positioning customer as a value co-creator, the role of the customer becomes clearer and more embedded in the processes whereas value co-creating just kind of happens as customer interaction always creates insight. (Vargo & Lusch, 2008). Because of the different definitions of value co-creator and value co-creation, noticing the usage of the different terms is important. Co-creating can be seen as an umbrella term for all of the value co-creating and being a co-creator is a method of value co-creation.

According to Grönroos (2011) the definition of value, value creation and the perspective affects how is value co-creation seen. With self-service model as a value creation method, customer as value co-creator or value co-creation is necessary. Customer must be committed to the value co-creation to make the most out of developing the self-service capabilities. The customer perception of value has to be in focus when considering processes or services where it is possible for the customers to be a part of the value creation process. Internal customers are more likely to co-create while the external customers might just keep co-creating value.

The findings in Martin et al. (1999) research in value co-creation was that the costs and benefits should be balanced, and the customers should be motivated to be value co-creators (Chan et al. 2010). Value co-creation with customer has two sides: possibility for enhanced customer value but resources are allocated in order to create that value (Gupta

& Lehman, 2005). This is the general value co-creation process from the customer perspective where resources of the customer are utilized into creating value into service provider's value chain.

According to Grönroos (2008) a situation where service provider acts as a facilitator that brings value foundation to the value creation process, the customer is considered as a value co-creator. The more value is already embedded in the value foundation, the less value the customer must co-create in order to get the value in use closer to the potential value (Grönroos, 2008). Customers might find additional information when co-creating value for better performing portfolio since the data is available for spontaneous use (Martin et al. 1999). The idea of how co-creating value is affected by the initial value embedded in the value foundation, value co-creation potential and the stage in value chain is presented in the figure 8:

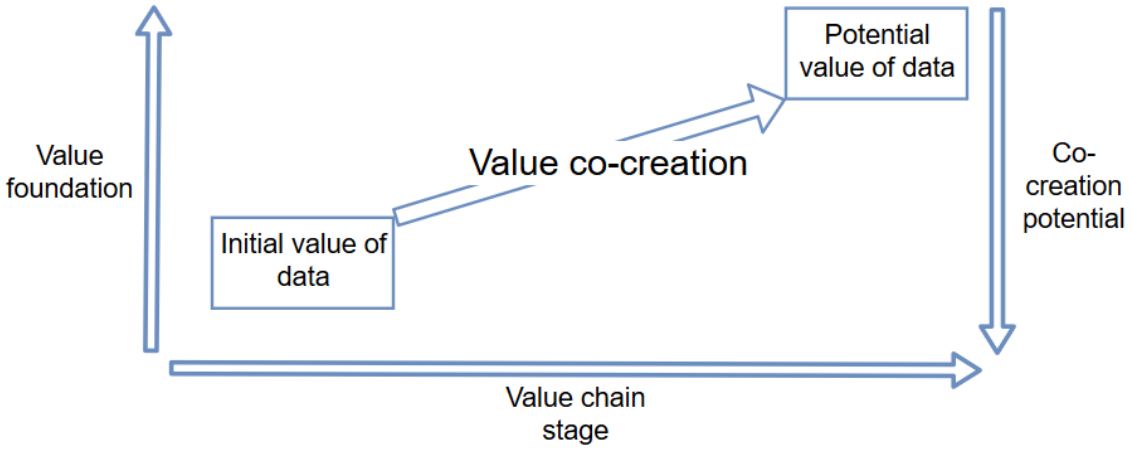

Figure 8. Value co-creation

In the value co-creation process, the facilitator offers the initial value. As the value foundation rises closer towards the potential of the value, the co-creation potential goes down. The ratio of value foundation and co-creation potential is affected by the stage of value chain as each stage on the value chain has higher initial value than the stage before. The value co-creation itself should drive towards getting into next stage in the value chain and so co-creation creates value by getting towards the potential value from the initial value.

When the self-service model is utilized, the role of customer increases (Grönroos, 2008). Grönroos (2008) and Vargo & Lusch (2008) both bring up the importance of clearly defining who is the facilitator and who is co-creating the value. If in the context of analytics, the data is taken out of the service providers facilities and the value creation shifts into the customer's value chain, the original service provider becomes the value co-creator. In this case, the expected value is different, and the service provider should position themselves into the customers value chain to try to create the desired outcomes.

4. ANALYTICS

This chapter consists of defining analytics value chain and how value is increased as the process goes through the value chain. The analytics capabilities describe the ability of managing the different stages of the analytics value chain. Finally, the data-driven enterprise and the ability to transform the data into value is described. All the topics included in this chapter aim to describe how the ability to create customer value through analytics can be enabled.

4.1 Business analytics

Organizations are investing in IT to enable better business process organizational performance efficiency (Aral & Weill, 2007). Business analytics systems aim to enable statistical analysis, modeling, simulation, forecasting and data mining. Business analytics creates value by improving processes, decision-making and organizational performance to gain competitive advantage. (Davenport & Harris, 2007; Kohavi et al. 2002; Holsapple, 2014). Business analytics aims to enable business users to do meaningful analytics without the need to ask help from an analytics professional (Kohavi et al. 2012). Enabling business analytics is harder to generalize than for example enterprise resource planning systems (ERP) (Shanks & Bekmamedova, 2012). Leveraging ERP system has very well-known benefits (Seddon et al. 2010) but leveraging the same way from business analytics requires more entrepreneurial actions from management (Shanks & Bekmamedova, 2012). According to Shanks & Bekmamedova, gaining the full benefits of business analytics requires practical process-oriented framework.

The benefits of business analytics are evolutionary by nature and distributed throughout the organization (Sharma et al. 2010) opposed to the benefits from ERP systems that are process standardization and integration (Shanks & Bekmamedova, 2012). Business analytics has matured from implementing data warehouses to enhanced reporting and optimized solutions (Watson & Wixom, 2007). Benefits of business analytics are achievable through developing the organizational capabilities while the organizational capabilities are enabled by the business analytics systems. Exploiting the benefits involves multiple users from different functional areas of the organization. (Shanks & Bekmamedova, 2012).

Resource-based view describes the resources as tangible or intangible and they are comprised from organizational and human capabilities and technologies (Shanks & Bekmamedova, 2012). Business analytics and business analytics related technologies help organizations to understand their business better and perform better with insight gathered from big amounts of data (Chen et al. 2012). According to Aral & Weill (2007)

organizational capabilities are critical for performance and according to Shanks & Bekmamedova (2012) the organizational capabilities consist of the processes and necessary skills to use relevant technologies in order to create competitive advantage. Strategic role of business analytics enables better data-driven insights while embedded into the business processes (Shanks & Bekmamedova, 2012). According to LaValle et al. (2011) the organizations that leverage data-driven decisions making, are making the same decisions twice as fast as the competition.

As business analytics is based on dynamic capabilities, the development process must be continuous (Shanks & Bekmamedova, 2012). The root of business analytics is not entirely based in technology since decision-making has many cases where data is non-numerical, and the qualitative method has to be used. Most of the quantitative analysis is much more effectively done with technologies as the amounts of data are very large. Business analytics can be seen as a transformational process. The set of capabilities need to be managed so the capabilities can be seen as competencies of the organization. (Holsapple et al. 2014). The real competitive advantage is built with the dynamic capabilities as the services and service providers can be adapted by other companies. Adapting to the dynamic capabilities does not happen very fast because obtaining and developing the dynamic capabilities might take years.

4.2 Analytics value chain

The benefits of business analytics range from enabling the analytics organization wide to embedding the data-driven decision making into the business processes (Shanks & Bekmamedova, 2012). The insights generated by analytics must be converted into value for further subsequent actions (Sharma & Shanks, 2011). The value occurs only when the data is used. The analytics value chain by Sharma et al. (2014) is visualized in figure 9:

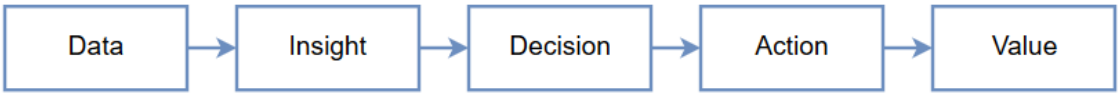

Figure 9. Analytics value chain (modified from Sharma et al. 2014; Seddon et al. 2017)

Technology enables collecting variety of data from multiple sources to be refined from data to insight later (Sharma et al. 2010). The insights do not emerge automatically from the data and to make the most of the data, analysts and business managers must engage into extracting knowledge from data with analytic tools (Davenport & Harris, 2007). Lycett (2013) describes the data to insight process as IT-driven sense-making process that is about understanding the phenomena that the data represents. At this stage, implementing machine learning to recognize patterns has a big potential because the amount of data is large (Lycett, 2013). Utilizing technologies in the data to insight process lowers the number of needed analytics professionals (Shanks et al. 2010, 2011; Shanks & Sharma, 2011). The problem is to offer platform that supports wide variety of different use cases

as a service. The volume is highest in the lowest stage of the value and leveraging technology at this stage is important in order to be able to serve all the users.

Creating decisions from the gained insights is vital for analysts and managers to create strategic and operational decisions to be able to generate value (Sharma et al. 2010; Lycett, 2013). Decision is defined as committing resources to execute the chosen action (Davis & Devinney, 1997). Decision making through business analytics is much more inconsistent as decision making process is highly subjective and context dependent. There are no clear rules on what insight should be included to a specific action. The decision-making process inside the organizations has a high impact on how well the insights are converted into decisions. Good ideas might get rejected by organization because of the process. (Sharma et al. 2014). The value perception of the decision makers affects what kind of resources it is profitable to tie into actions through the decision-making. For business analytics-based decision making there must be enough information about the customer context (Sharma et al. 2014). Making sure that the organization's decision-making process is valid in the business analytics context, might make a big difference on how good quality decisions are made from the insight.

Decision is turned into value through making a decision to commit resources to a specific action. This action must be taken for the value to be realized. Usually at this level the potential of business value is much higher than the captured value. The gap between potential value and captured value means that the business analytics can be leveraged to a much higher potential by being able to make more high-quality decisions. (Sharma et al. 2014). Even with high-quality decisions, the implemented value is dependent on customer value perception in terms of how the customer perceives the delivered value. Involving key stakeholders should improve the quality of decisions (Shanks et al. 2010; Shanks & Sharma, 2011) and the higher quality decisions should lead into more value.

4.3 Analytics maturity

The technological capabilities affect what can be done and measured through business intelligence & analytics (BI&A). Structured data is the base of gaining insight but unstructured data and IoT base content are becoming more important in making good quality decisions. (Chen et al. 2012). Improving capabilities will improve the maturity of the organization by enabling the more complex business analytics processes (Holsapple, 2014). Performance management in the analytics context means measuring the difference between strategic goals and measured performance (Kaplan & Norton, 2008; Kloot & Martin, 2000). Managing the capabilities and measuring performance means understanding the relevant business dynamics through data and analytics (Schläfke et al. 2012).

The analytics related capabilities evolve over time while rare and non-substitutable resources will eventually lead into benefits and competitive advantage (Wade & Hulland,

2004). The organizations' capability to lead and develop the dynamic capabilities are important when measuring performance (Helfat et al. 2007). While it is clear that developing the capabilities affect the ability to create value, it is unclear how a single capability can affect the business analytics value creation. Identifying the areas of strength and weakness helps organizations to prioritize their resources to build capabilities in the future (Cosic et al. 2015). Effects of analytics maturity to be able to manage different kind of services is visualized in figure 10:

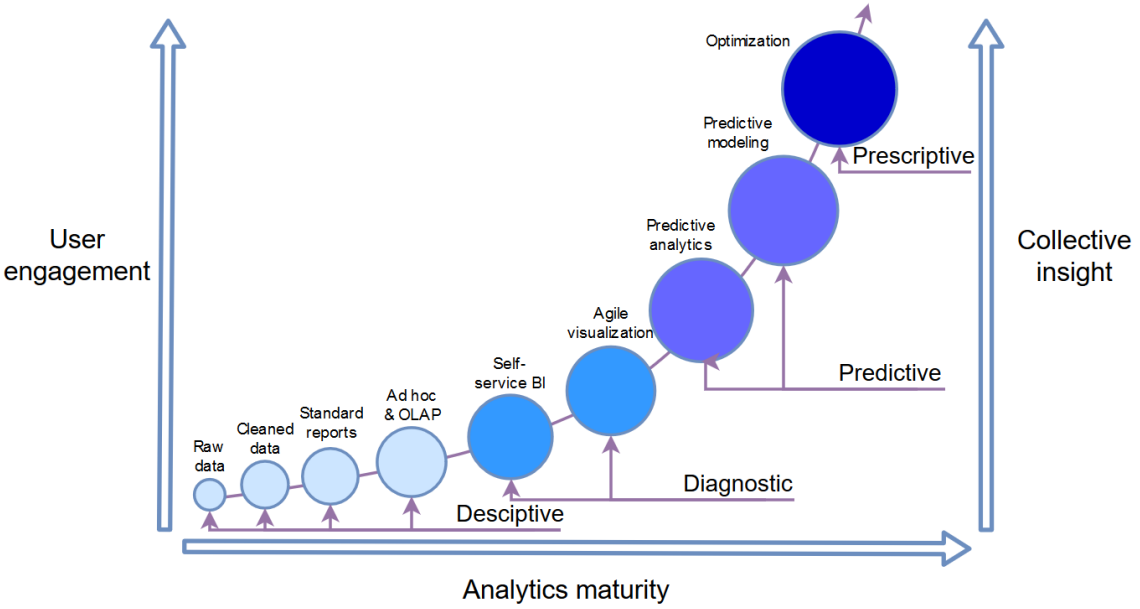

Figure 10. Analytics maturity assessment model (Gartner, 2017)

The enterprise information management model by Laney (2017) consists of seven different categories that are ranked from one to five to represent the maturity in each category. The written descriptions of each levels are presented in the appendix F. The average distribution in the average calculated from all the categories in the research by Laney (2017) are:

- Level 1: Aware, 10%
- Level 2: Reactive, 30%
- Level 3: Proactive, 40%
- Level 4: Managed, 15%
- Level 5: Optimized, 5%

The willingness of the organization to evolve in the information management practices must be assessed in order to set the goals and align the goals with the business needs (Laney, 2017). Having data-driven mindset as an organization and higher information capabilities enhance performance in many ways (Mithas et al. 2011, 2012; Saladanha et al. 2013; Schryen, 2013). The use of analytics capabilities include differentiating, reduc-

ing costs, adding volume, optimizing risks and transforming business models and business processes (Mithas et al. 2013; Gillon et al. 2014). This helps organization to keep competitive. The categories used to assess the capabilities are defined below:

Vision

The business goals must be defined that the vision should support (Laney, 2017). Identifying and communicating the vision of the organization helps employees to focus on that vision (Ferreira & Otley, 2009). When the vision of how information assets should be used, managed and shared across the organization and it is communicated to all stakeholders, everyone can work towards the common vision. Business analytics aims to empower business users throughout the whole organization (Kohavi et al. 2012). It is important to remember that sharing the vision is not just important for managers or IT department since most of the users work in the business units.

Betser and Belanger (2013) suggest that the future in analytics lies in data streams, cloud, mobile, non-SQL databases, and new forms of data. Importance of self-service analytics, pervasive analytics, social analytics, scalable analytics, and real-time analytics have been identified (Kobelius, 2011). The vision often includes the more advanced solutions that should be focused and enabled in the future. The current business problems should get the highest priority in the vision of the current state of information management.

Strategy

Strategy is the long-term plan of how the vision is going to be achieved (Laney, 2017). Being capable of executing the vision means that the business goals are relevant, and the capabilities are raised in the same pace. Having high technological capabilities and low organizational capabilities or vice-versa, does not cover the needs to get through the analytics value chain. Identifying success factors and bring them to attention of managers and employees (Ferreira & Otley, 2009). The success factors on how the vision can be executed should be communicated from employees to managers and from managers to employees. Everyone has their own perception on what the problems are, and the different opinions should be discussed. The analytics tools are often designed for quantitative analysis and not suitable for business users' needs (Kohavi et al. 2012). The strategy of choosing tools when enabling business analytics is important. The tool or tools should cover the needs of business user and the management member. The future business initiatives should be included to the long-term strategy to make sure that the advances in IT are taken into account (Laney, 2017).

Metrics

Performance management is the key to demonstrate value of the initiative by measuring the effectiveness (Laney, 2017). Metrics have often unrealistic goals and the set metrics are not tied to business goals (Kohavi et al. 2012). The goals of the organization should

be tied directly to the measured business metrics (Laney, 2017). Selecting the correct metrics is important so the actual progress or effectiveness can be measured. The problem might be the business goals if the effectiveness of reaching the goals is continuously low. Select the key performance targets and measure the gap between strategy and reality (Ferreira & Otley, 2009). Identifying the gap between execution and expectations helps to understand the business problems better.

Governance

Governance is the capability to orchestrate different capabilities in organization for better ability to leverage business analytics (Sharma et al. 2014). Analytics leaders must set the principles, guidelines, policies, processes and standards for using information assets to make sure that the organization can achieve the set goals (Laney, 2017). Organization that focuses more on governing the information has higher potential than organization focused on IT artifacts (Tallon et al. 2013). Governance is also used as a mechanism for managing the use of business analytics and assigning decision rights and accountabilities to align business analytics initiatives with organizational objectives (Weill & Ross, 2004). The set processes and policies give the rights to make decisions. Governing the data assets should increase the quality of decisions.

Organization and roles

Illustrate organization's structure and see how capabilities affect organization (Ferreira & Otley, 2009) and the organizational norms, values and patterns that form the systematic ways of leveraging data (Leidnar & Kayworth, 2006). Organizational capabilities are closely tied to governance as the governance framework is set there. The ability to communicate the organizational capabilities and responsibilities inside the organization will increase the capability to work towards common goals (Ferreira & Otley, 2009).

Business analytics aims to empowering of business users to reduce the need for large number of analytics professionals (Kohavi et al. 2012). Analytics professionals are a scarce resource and being able to lower the demand through other capabilities is a competitive advantage. The roles in decision making have high impact on how high quality the decisions derived from insight are (Sharma et al. 2014). If the business users can utilize the data and insight better themselves, they are able to solve business problems better than the analytics professional because of their knowledge of the business.

Life cycle

Well-defined information architecture and information flows help the organization to govern the data and drive value from data to business objectives (Laney, 2017). The problem with data life cycle is not having irrelevant data but the knowledge about data availability, how the figures are created and what is the original data source. Defining the information flows helps people to better utilize more of the available information. Cycle

time of collecting, analyzing, and acting on enterprise data should be reduced in order to enable business users and make them rely less on analytics professionals (Kohavi et al. 2012). Having timely data is important especially when the data value diminishes as time passes. When the data is processed faster, the business professionals have more time to gain knowledge about the newest data and create better quality decisions.

Infrastructure

Recognizing the importance of including emerging technologies or at least the possibilities to utilize emerging technologies later, is important in overall architecture (Sharma et al. 2014). Integrating multiple data sources for analytics purposes is often complex and expensive (Kohavi et al. 2012). Innovation can be maximized by utilizing multiple vendors if multiple tools need to be used (Nowson, 2018). Connecting different technologies to integrate data is a must for effective infrastructure (Laney, 2017).

Comprehensive models enable business users to analyze data further than usually. Analysis requires hardware capacity when dealing with large amounts of data. (Kohavi et al. 2012). The cloud capabilities, when it comes to scaling and flexibility, have so much more potential than the on-premise. The capacity requirements for calculation are periodic as the need for more capacity can get focused on a single time of the day or on specific dates. Development and use of the infrastructure should be done together with business analytics initiatives (Negash, 2004). The infrastructure should support the business initiatives, so the infrastructure can make solving the business problems more efficiently.

5. SELF-SERVICE

This chapter introduces what kind of self-service models have been widely adopted. First it is explained how self-service creates value. Secondly the analytics specific features are gone through in self-service model. Finally, the capabilities of self-service in the analytics portfolio are introduced and what analytics capabilities are important to take into account when offering self-service analytics for the customers.

5.1 Self-service technologies

Self-service technologies (SSTs) have been emerging all the from 1990s to change the way customers interact with companies to create service outcomes. The main point of SSTs is that the growing number of customers can be served easier and faster with technologies than in interaction with a service employee. (Matthew et al. 2000). SST can be defined as technological interface to enable customers to produce service without employee involvement (Meuter et al. 2000; Bitner et al. 1990). The capability to offer alternative ways to interact with organizations is becoming more important. Availability, speed and ease of usage is now more important than ever as people are continuously connected through mobile devices.

The widely adopted SSTs include hotel booking, self-service registry, automated teller machines (ATM) and other services of the Internet (Matthew et al. 2000). These are the kind of SSTs that most people would not like to use in the original way anymore because of the flexibility and time consumed. Usually the choice is to choose between SST and interpersonal encounter and when the customer is free to make the choice, they will choose the most convenient option (Meuter et al. 2003; Dabholkar, 1996). Some customers will prefer to use the traditional services, but all the customer profiles have to be taken into account when creating the portfolio of services.

To enhance chances of successful adoption of new SST, the sources of satisfaction and dissatisfaction have to be investigated. Having different focus between satisfactions and dissatisfaction of the SST and the original service, the more potential there is to the new service. (Matthew et al. 2000). Successful SST will remove the biggest dissatisfactions with the original service. While the SST might have some new areas of dissatisfaction, it offers diversity to support different customer segment needs. The big important aspect of offering new self-service is that it does not have to be perfect for all the customers. Different customers appreciate and need different value creating features depending on the self-service context.

Originally introduced by Flanagan (1954) critical incident technique (CIT) is a quantitative measure of different attributes in service encounter. CIT can be used to determine the

sources of satisfactions (Matthew et al. 2000). Bitner et al. (1990) has classified three main categories in interpersonal encounters:

1. Employee response to delivery failure (service recovery)
2. Employee response to customer needs and requests (customization/flexibility)
3. Unprompted and unsolicited actions by employees (spontaneous delight)

Even though the three listed categories are not specifically for data or analytics-based service, they are the base for why customers are dissatisfied to a service. The same categories are present in the analytics services as customers are mostly dissatisfied with having to wait the backlog to get the necessary changes. When assessing an SST, the terms must be modified since there is no employee contact unless delivery failure forces customers to use the interpersonal service.

The responses inside the categories can be opposite. Employee response to customer needs and requests was both area of satisfaction and dissatisfaction. (Bitner et al. 1990; Grove & Fisk 1997). The areas of satisfaction and dissatisfaction are subjective in the same way as the value perception. Depending on how customer perceive the value of the service, they will feel the satisfaction or dissatisfaction in it. Segmenting customers becomes more important to understand how the value should be created for that specific customer.

Types of SSTs according to Matthew (2000) has separated SSTs into different categories according to their use cases. The categories are customer service (e.g. hotel reservation), transactions (e.g. online banking) and self-helping (e.g. educational videos). For the purpose of this thesis, all the said categories are important as enabling the analytics self-service there should be a combination of customer service, transactions and self-helping. Depending on the goal of the self-service the primary focus can be in one of them, but all the categories must be observed.

The idea of categorizing the SSTs is an initial trigger on what the advantages and the value should be. SST can have multiple purposes but for example service for self-help has the biggest advantage when it can bail the customer out of a troubling situation. Matthew, 2000). The biggest advantages of STTs according to Matthews (2000):

1. Bail customer out of troubling situation
2. Perceived value (mostly time, ease of use, access)
3. Did its job

If SST can solve a problem that the customer has, it is the biggest advantage. New technologies have a big possibility to not be satisfactory. The perceived value is subjective and depends on the context. While same encounter with SST might be with one customer segment, other customer segment might struggle to see the value in it. The SST might

have an advantage by simply doing its job the way it was designed. The biggest disadvantages according to Matthews (2000):

1. Technology failure
2. Breakdown after the transaction

Recovery is not encountered in SSTs and the recovery methods are usually lacking compared to the successful encounters (Matthew 2000). When technology failure occurs, it is a very frustrating moment to the customer because the only way it can possibly outshine the interpersonal service, is when the technology works correctly. If the technology fails, the customer must use interpersonal customer service anyway which means the SST becomes obsolete. Breakdown after transaction means that the initial service did work correct, but post transaction breakdown initiated some failure protocol that is not necessary after the transaction was already successful.

Failures in service is the biggest single factor for not using or adopting the SST (Matthew 2000; Matchett, 2017). Based on this the routine failures should be handled automatically as part of the usual processes. It isn't possible to achieve 100% automation in SST if user experience is to be kept at high level (Matchett, 2017). The problem with automating everything is that there is no differentiation. Even when the customer seeks to use the service to avoid employee contact, the need to be noticed and get service still exists in some form.

Because of the value perception of different customers, the SST should be offered as alternative. Different options must be available as different customer segments look for different things in the SST since every customer tries to choose the service with least points of dissatisfaction. (Matthew, 2000). Demographics characteristics of individual are pervasive in how SST is perceived (Rogers, 1995). The customer value perception is important also with SST. The different personal demographic characteristics might be even more important when the service is based on technology.

5.2 Adopting self-service

Traditionally the service quality is the difference between customer expectation and the actual perceived value of the service (Grönroos, 2001; Parasuraman et al. 1988; Bitner & Zeithaml, 2003). Due to subjectivity of customer value, the customer value is overlooked in the self-service's advantage over interpersonal service. Instead the ideology of what SST could bring for the customer whereas interpersonal service cannot, is the most important factor. To be able to deliver the interpersonal service when the SST fails, it requires that there is also the more traditional service available all the time and the SST can be focused on removing the dissatisfactions of the traditional service model. IT systems are usually chosen and designed to appeal for the infrastructure and operations leaders and technical personnel while the business users remain the main audience (Matchett,

2017). In self-service, where business users make the greatest number of users, the ability to create services usable to the business users is the most critical part.

Self-service benefits according to Globerson & Maggard (1991) are convenience, time saved, self-control, money saved, self-image, risk and self-fulfillment. Meuter et al. (2000) on the other hand says that people accept SST if it offers ease of use, the ability to avoid interference from service people, time savings, convenience and financial savings. The role of SSTs is a strategic offering for the service providers (Dabholkar, 1994; Meuter et al. 2000).

Dabholkar (1996) has identified following deciding factors as the key indicators when choosing to use the SST: speed of delivery, ease of use, reliability, enjoyment, and control. Ho & Ko (2008) have less factors but they have taken the customer readiness into account of how the value is perceived. As per the earlier chapters in this research, the customer perception is an important factor when assessing the outcome. The expected value can be predicted based on the factors that analytics self-service gives over the interpersonal service delivery while utilizing the same value chain as in analytics.

Customer readiness is the user's preposition to use technology (Liljander et al. 2006; Meuter et al. 2005). Parasuraman (2000) uses the term technology readiness but they both mean the same thing. Parasuraman defines technology readiness as the propensity to embrace and use the new technologies. For the purpose of this thesis, the customer readiness term is chosen but it includes both customer readiness and technology readiness definitions. Customer readiness can be seen as the changing condition of customer value. The actionable features of customer readiness can be influenced if they are noted when the possibility exists (Bitner et al. 1990). Bitner et al. says that educating and training the customer to clarify the customers' role, helps the SST adoption.

The value chain correlates with the readiness since different customers are in different level of readiness and so will adopt the new technology differently. Depending on the customer profile, the more technology ready the customer is, the more value is expected in the technology-based solution. This leads into more willing customer to at least try the new SST and after that it is based on the perceived value of the differentiating value creating features. Combining the theories from Ho & Ko (2008), Dabholkar (1996), Globerson & Maggard (1991) and Meuter et al. (2000) a visual presentation of features affecting if SST is adopted by the customer, is presented in the figure 11:

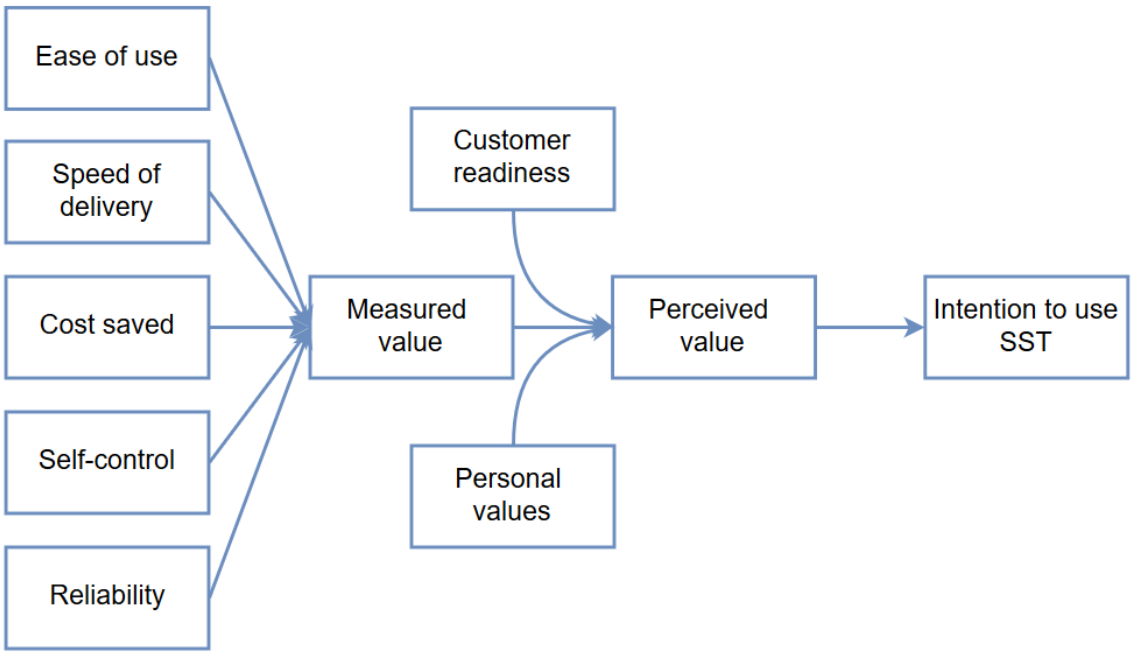

Figure 11. Features affecting SST adoption

The key mediators of individual difference are identified by Meuter et al. (2005). Meuter et al. has divided some of the key mediators into specific value dimensions. Because each customer perceives value differently, the factors of customer differentiation should be identified. Meuter et al. (2003) has identified five factors: technology anxiety, age, gender, income and education. The key factors affect on all the features on how the value is perceived. The features affecting SST adoption in figure 11 are heavily affected by the personal values but also the customer readiness. The analytics maturity of customer or more generally the customer readiness is factor among the personal values to affect how the SST's value is perceived.

Ease of use is the ability for user to handle technology free of effort (Davis et al. 1989) and customers' ability to use the service is critical (Gustafsson et al. 1999). Customer will be drawn into the solution where the goal is achieved in the easiest way (Langeard et al. 1981). If the customers expect the service to be difficult to use, they may fear looking foolish when struggling to use the service (Dabholkar, 1996). Without to ease of use, the customers might not even try the service. The ease of use requires that the customers are educated and supported to use the SST (Parasuraman & Colby, 2001).

Speed of delivery is an important factor to those who see self-service as the better option than interpersonal service (Langeard et al. 1981; Meuter et al. 2005). Expected speed of delivery of the self-service technology option has positive outcome in the expected quality (Dabholkar, 1996). Being connected all the time raises the expectations for the services. The service is supposed to be available instantly and all the time.

Costs saved is related to both time and money when using the service (Davis et al. 1989). Enhanced effectiveness, productivity and improved performance have been good indicators on SST adoption intentions (Agarwal & Karahanna, 2000). Costs or sacrifices to get the task done are tied to effectiveness as the same task can be done in less time-consuming way if the SST performs well. If the perceived value for the customer to create value creates cost savings, it is a reason to adopt the SST. Increasing the cost of the interpersonal service is one way to improve number of customers adopting the SST (Liljander et al. 2006).

Meuter et al. (2000) describe the self-control as the possibility to affect customers' feelings to make the SST feel better than interpersonal service. Perceived control is the amount of control over the outcome of the process (Bateson & Hui, 1987; Langeard et al. 1981). According to Murray & Schlacter (1990) the control of the self-service reduces the perceived risk and Lee & Allaway (2002) say that the reduced perceived risk enhances the perceived value. Lee & Allaway continue that not adopting the SST might be scared of the control but unable to see the real value or the SST is too demanding to use. Self-control of the service is clearly one feature that creates value in SSTs.

According Matthews (2000), the biggest disadvantage of SST is technology breakdown. Reliability was identified as an important determinant of choosing a service by Parasuraman et al. (1988). Expected reliability has positive outcome on service quality (Dabholkar, 1996). Non-reliable SST is not useful since Davis et al. (1989) defines usefulness as how well the measured service can improve execution of the task (Davis et al. 1989). If the SST is not reliable, the whole service is compromised as the customer has to use the interpersonal service if the service is not reliable.

Each of the frameworks repeat the same main dimensions. The newer researches are based on the frameworks introduced in the 1900s (Langeard et al. 1981; Bateson & Hui, 1987; Davis et al. 1989; Dabholkar, 1989). Although the focus of these frameworks is not the analytics services, the same motivators drive towards customer adopting the SST. As the perceived value is based on the personal values, it does not matter in which context the value is created because the same motivators are effective.

5.3 Self-service analytics

The service-oriented business processes utilize processes, architecture and infrastructure that support standardized processes for accessing data (Delen & Demirkan 2013). Service-oriented aspect is important when discussing analytics as the goal is to enable business users. As a service is something that is very close to the self-service ideology as the service aspect requires many aspects of self-service adoption to be noticed in creating the service. The platform or tool that is used to access data does not matter but the accessibility for any business process to access the data it needs (Delen & Demirkan 2013). The simplified analytics value chain by Sharma et al. (2014) and Seddon et al. (2017) can be

seen as two-dimensional space where the user engagement adds the initial value by moving forward in the value chain. The two-dimensional model is visualized in figure 12:

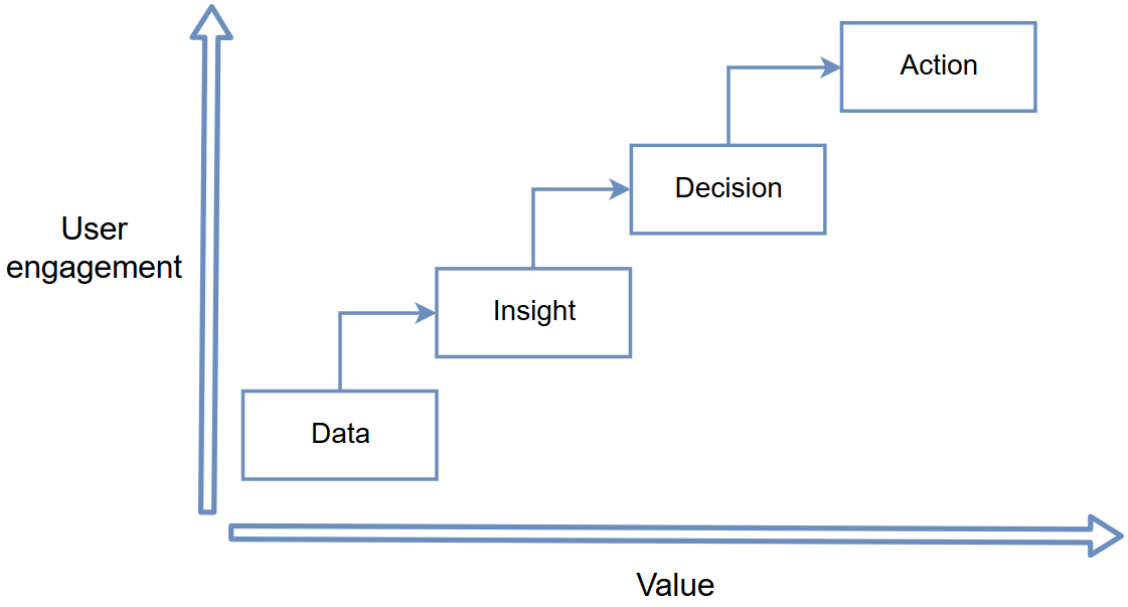

Figure 12. Analytics value chain stages (modified from Sharma et al. 2014, Seddon et al. 2017)

The data can be in different forms, e.g. cleansed or not, for different purposes (Delen & Demirkan 2013). In addition to having the data available at all time (Delen & Demirkan 2013; Matchett 2017; Truong & Dustdar 2009), the data has to be modeled according to the specific context (Truong & Dustdar 2009). Each form of the data serves a purpose. Different forms of data and different stages of value chain offer variety for the customers. Self-service enables customer to engage on co-creating on the value chain instead of paying for the whole value chain through exchange.

Self-service should have support for ad-hoc possibilities. This can be achieved by developing the methodologies, concepts and infrastructure to support ad-hoc decision making. (Berthold et al. 2010). For analytics as a service to be effective the data has to be modeled for the context of use cases as Truong & Dustdar (2009) mentioned. The problem in creating all-round models ready to use for users, is the lack of business context for the developers (Berthold et al. 2010). Standard reporting content might not be enough for some customers and while the data is available all the time, the user expectations vary from customer to customer. Different value propositions of different self-service stages are meant to fulfill the different customer needs. The figure 13 describes how self-service creates customer value immediately as customer chooses to purchase service in certain stage and the expected value is realized:

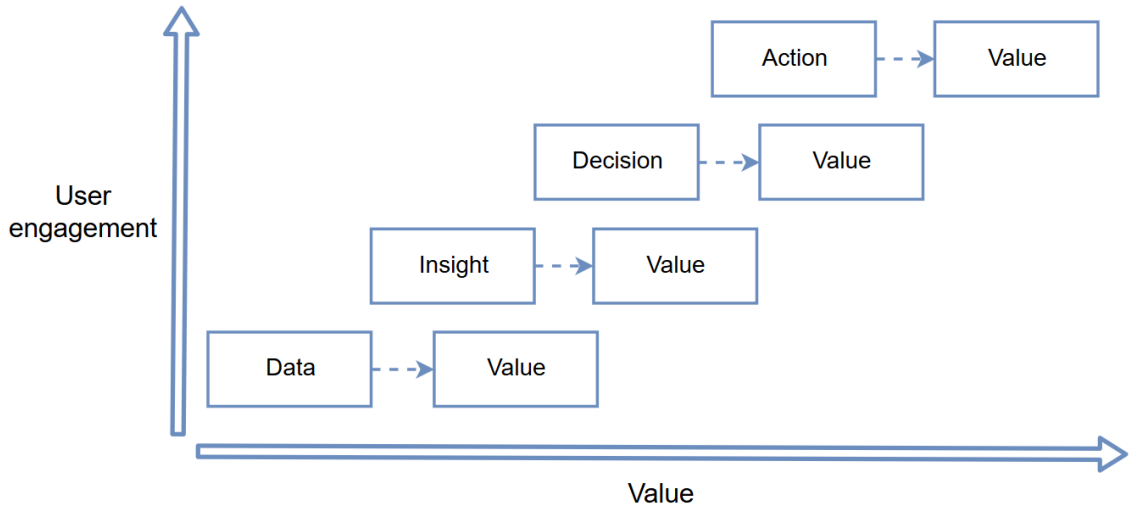

Figure 13. Self-service value creation at different stages of analytics value chain

The problem with offering analytics as a service is that the non-technical users must be able to use the service to fulfill their business needs. According to Berthold et al (2010) the configuration, reporting and analysis should be available to everyone even without technical skills. All the terminology and language are to be understandable for business users also (Berthold et al. 2010). The data and insight stages are most effective to be offered as a service since the volume of data is highest. Automating decision-making process requires a lot more inputs and analyzing the correlation between those inputs. The higher complexity use cases can be enabled case-by-case but the capability to enable decisions as a service has to evaluated after the earlier levels are being managed efficiently. Nevertheless, the value chain has to be gone through even if the self-service level is data. The value of the service is realized immediately but the value for the customer still awaits the decision and action based on the data.

At the moment there is a really wide gap between BI experts configuring the system and creating the queries, and the business users who consume the predefined reports created by the technical users (Berthold et al. 2010). Building IT service to support customers instead of having persons to do same contacts is likely to create monetary savings (Matchett 2017). Data as a service is related to data discovery, data processing and storing the data (Terzo et al. 2013). Processing the data requires the platform and the tools from the service provider or the tools are provided by the customers themselves. Data discovery offers higher possibilities to achieve business benefits (Howson, 2018).

The operational aspects of DaaS, e.g. performance, reliability, availability, and security, should not be the only focus (Truong & Dustdar 2009). The solution should be flexible, so it supports the needs of wide variety of user groups. The data models should be flexible, scalable data store, business configuration methodology, information self-service and integrated collaborative environment. (Berthold et al. 2010). Self-service requires the analytics process to be shifted from IT-produced to IT-enabled and insight is created in collaboration instead of IT-produced distributed reports (Howson et al. 2017). The different

concerns with data products can be mitigated through the analytics capabilities as they are tied to most of the data as a service related concerns observed by Truong & Dustdar (2009). The DaaS related concerns are listed in table 2:

Table 2. Capability concerns for DaaS (modified from Truong & Dustdar, 2009)

Category	Properties
Data quality	Timeline Update Objectivity Free-of-error Cleaning Consistency Granularity Domain-specific metrics
Data security	Privacy Encryption
Auditing	Logging Reporting Warning
Data lifecycle	Backup/recovery Distribution Disposition
Quality of service	Performance Dependability
Business	Price model Price Service credit
License	Usage permission Copyright Liability Law enforcement Domain-specific intellectual property rights

Data quality and quality of service are the main associations in data-based service since the quality must be on point (Truong & Dustdar 2009). DaaS supports fundamental requirements for data governance (Truong & Dustdar 2009). The data aspect of the service, and revising it time to time, is as important as operational aspects (Truong & Dustdar 2009). Although the operational and the data aspects of the service are recognized in the capability concerns of table 2, dynamic organizational capabilities are not. Leveraging the organizational skills as part of a service is an important part. The concerns are tied to a data as a service product but Truong & Dustdar (2009) have not thought how the people can make the service more effective.

6. EMPIRICAL RESEARCH

This chapter is a description of the empirical research process. Empirical research process includes survey and group interviews. The group interview participants are introduced and the methods to analyze both the surveys and the interviews are introduced.

6.1 Participants

The term “participants” is used to describe both the group of people answering to the survey and participating the group interview. The participants were the same in each iteration of survey and group interview. Company X is a property management company with presence in all the Nordic countries excluding Iceland. All the participants are employees of the company X. Each country has chosen the participants that are most suitable to answer to the survey before each workshop and to participate into the group interviews. The requirements and the analysis are based on the future solution. The participants include employees from business users to business intelligence developers to get the best possible overall picture. Choosing the right candidates was done together with the company X.

Reason to do both the survey and interviews was to make sure all the participants are able to gather requisite information and to explore the topics if needed, before the actual group interviews took place. The design of the future solution is based on the answers gathered from the participants.

Group interviews were on the following themes:

1. Internal reporting and analytics
2. External reporting and analytics
3. Data warehouse
4. Summary

The group interview participants were chosen based on the theme and the knowledge about the topic. Same participants were utilized as much as possible in order to stay consistent and develop the discussion about the solution as whole.

6.2 Surveys

The surveys were sent to each country before each group interview. Each country provided one set of answers to each survey before the actual group interview. The aim was to get the participants to innovate the themes by giving them some idea of the structure

of the upcoming group interview. Survey also enabled using employees that did not participate the group interviews to get the necessary information as the number of participants had to be limited into a few for each country.

The survey questions were at a general level, so the answers can be compared between countries. The future solution was predicted to be a single solution to be used by all the countries. The different requirements and visions about the future of data and analytics management had to be generalized and unified at some level. Technical side was not the focus of discussion since the capability requirements come from the current business requirements and the future needs on how to can the business intelligence stack create value for both internal and external customers.

The survey questions were gone through with the area experts and reviewed by company X before distributing it to the interviewees. The surveys were iterated based on the reviews to make sure that the questions are objective and easy to understand. The questions for each survey are presented in Appendix A, B, C and D.

A separate survey about analytics capabilities was done to discuss about the level of capabilities in the future. This was to get understanding what kind of services the company is able to create and deliver in the future. The analytics capabilities assessment follows the same framework as introduced in the chapter four. The written descriptions of each capability levels are presented in Appendix E with the assessment of the future level of that capability.

The used analysis methods were qualitative as there was only a few questions for each survey. Most of the questions were already classified as the surveys were focused in different categories. The primary method was summarizing the answers from different countries in order to understand what themes were the most problematic and if there were big differences in the views of different countries.

Analyzing the survey started with combining the answers from different countries. The answers were compared with each other in order to create a common proposal to the requirement as there should not be country specific requirements. Each question from the survey was gone through in the group interviews. If there were similar requirements from different countries, they were combined. The necessity of a requirement from just a single country was further discussed in the group interview.

6.3 Group interviews

The group interviews were conducted after each survey to discuss the questions and the answers. The group interviews were semi-structured theme interviews and the premade structure was the same as in the surveys. First thing was to make sure that each participant had understood the question correctly and answered the question as intended. The second

part was to discuss the answers each country had provided and then discuss what is the outcome of that question.

Each group interview was a full day workshop. There was no strict structure for the workshop, so there was a lot of room for open discussion about the questions or about the theme. The flow drove the discussion forward and the main problem was to keep the discussion on the topic at hand. All the necessary topics were covered in one of the group interviews. Some additional information was found during research that were not discussed in the group interviews. The timespan to conclude all four of the workshops was two months, so the preparation and analysis of different iterations overlapped in some parts.

The key points of discussion were marked into the meeting notes since the group interviews were not recorded. The analysis of the group interviews was based on these key points discussed in the workshops and the finalized list of requirement list that was updated during all the group interviews by adding the new requirements to the list after verifying the need through discussion. Figure 14 represents the process through surveys, group interviews and analysis process:

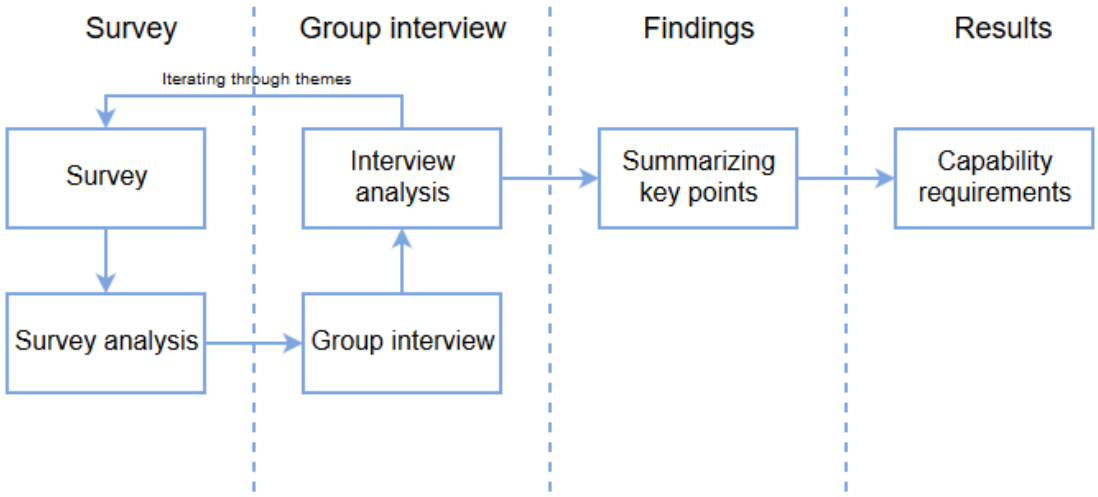

Figure 14. Empirical research process

All four group interviews were held before summarizing all the results to raise the key points. The result was the list of capability requirements for the future solution.

The requirements were classified in categories 1,2 or 3 based on the criticality of the requirements. The categories were the following:

1. Must have
2. Must have later
3. Nice to have

The first category with highest priority “must have” requirements have to be implemented in the MVP product, second priority requirements can be implemented after the MVP is deployed but these requirements are a must in the future, and the last category is the “nice to have” which means that the not-so-necessary ideas and country specific requirements are listed here.

The interview questions were already categorized in the analysis of the survey so only summarizing was done to the interviews. Also, the off-topic interview meeting notes were taken into the analysis even though they were not in the original interview questions. Semi-structured interviews gave the possibility get answers that weren’t questions originally but important enough for the whole solution.

To summarize the interviews, the single requirements were combined into a more general description of the goal. These goals are not the actual requirements but the purpose and value driver in the future service. The reason was to minimize the number of gaps by designing the solution to be a fit for as many requirements as possible and enabling the future development and enhancement on top of the MVP.

7. EMPIRICAL RESULTS

This chapter introduces the results from the surveys and the group interviews. The focus is on the group interview results as they are the final results of the empirical part. As the focus is on the future solution and service that does not exist yet, the results are highly speculative. The interviews are not recorded and thus the different key points are not quoted.

7.1 Analytics maturity assessment

The written descriptions of each category are presented in the Appendix F. Aim of the thesis was to pick a realistic target state in order to be able to assess the capability to deliver different analytics services. The targets should be revised after making improvements to capabilities since these are the initial targets. Target state is hard to assess as there are multiple earlier separate companies now under the same management. Target state is also affected by the vision of what kind of services should the organization be able to deliver in the future and so, at what level should the capabilities be to achieve this. Capabilities describe the analytics maturity in the organization and so is directly tied to how well the organization can deliver services when moving higher in the value chain. Operating in the higher levels as a service requires more systematic approach and employee commitment to the data and value-based approach.

Vision

Level 3: Proactive was chosen for the vision based on the need to enable business users across the organization to utilize the future solution. The earlier levels are focused on just the operational needs and IT lead business intelligence is somewhat siloed. Breaking those silos and enabling all the users is the number one priority. Using external and different types of data together and understanding the need for data in order to create the wanted outcomes is something that should be achieved. The higher levels require organization to be more data-driven for the information to fuel all the processes. The day-to-day work is still operational, and all the customers do not gain so much value from the information as the customer segments can be far from one another in terms of value perception.

Strategy

Level 3: Proactive was chosen to produce more dynamic and responsive organization wide strategy to manage data assets. Centralized assets are shared in the organization and C-level sponsor is coordinating the organization wide strategy. The higher levels are not fulfilled as there is no real CDO office and the analytics operations are still separate tasks.

The lower level functions such as individual source of powers and purely technological focus is solved.

Metrics

Level 3: Proactive was chosen since the financial justification does come with a direct benefit in mind. Qualitative measures for the analytics operations are understood as the value created is not always financial. The lower level problems such as minimizing expenses and subjective goals are not the focus points. Of course, people are biased but the main idea is to enable a larger number of people for multiple tasks through data and analytics. The higher levels require information management to be its own managed metric itself. Information related metrics are tied to business metrics and the value of information is measured and tracked.

Governance

Level 3: Proactive was chosen to support the integrated MDM and metadata programs. Data is standardized, and quality is mostly automated. The lower level shortcomings such as information silos and data trust issues are solved. However higher-level issues are still there. Policies are set based on the business needs, but they reflect mostly from primary processes. Same policies are not carried through projects. Focus in governance is to have centralized data governance but hand out local stewardship of data.

Organization and roles

Level 3: Proactive was chosen based on the current roles and how organization is organized. The data modeling is mostly done by IT department and the specialty roles are housed in the IT department. Business units are raising the skill level through technology to enable self-service. There are not many in-house data related roles but the need for them in the future has been recognized. Many of the roles are still outsourced. The analytics overall maturity affects the need of professional analytics roles as when the analytics is managed in high level, the business users should be able to act without analytics professionals.

Lifecycle

Level 4: Managed was chosen in order to reflect the need of automating the data lifecycle because of the self-service goal. The focus is enabling the data and information across the organization while making sure that the data stays relevant. Information architects are used in larger projects, but they are not embedded in maintaining. End-to-end lifecycle is not widely established. Standard procedures are used across organization and architecture drives the processes and policies. Shortening the length of process from gathering the data to be able to use it, raises efficiency.

Infrastructure

Level 4: Managed was chose due to the intended new infrastructure where infrastructure is a centralized cloud-based solution. The infrastructure is an enabler, not just a tool. The processes rely heavily on utilizing the infrastructural possibilities to enable business users to use the solution to be able to cover some of technological shortcoming of the user. The investment is a solution investment and not just purchasing a tool for a purpose. The solution covers known business needs and analytics capabilities are built to cover organizational needs. The technology cannot be the only enabler of capabilities, but infrastructure should be leveraged according to the other capabilities.

Summary

The average score for the company X's target state is 3,3. All the categories have the same weight to calculate the average. The higher targets are on the more technical categories and the reasoning behind that is to have higher capabilities through technology and automation through technology. The summary of categories and target levels is presented in table 3:

Table 3. Analytics maturity assessment

Category	Target level
Vision	3
Strategy	3
Metrics	3
Governance	3
Organization & roles	3
Lifecycle	4
Infrastructure	4

The score would place the company X in the upper half of the organizations of the study presented in the literature review. As this is the initial assessment of where the capabilities should be aimed in order to be able to deliver intended services, the score is in line with the services. The average goes under the description "proactive" that describes well how the organization should manage their data and information assets as whole. Next level is managed but only 20% of the research's companies are placed in the managed category. The fact remains that the company X is not in IT or data related business on day-to-day

context but how the created value is communicated to the customer, heavily depends on business intelligence.

7.2 Capability requirements

Capability requirements are the summarized goals of smaller requirements gathered in the surveys and group interviews from the different themes. The themes were internal and external reporting, infrastructure and future innovation. The idea of these goals is to clarify why the requirements are important by explaining what the goal is from customer perspective. A single requirement can be very narrow and get really technical but the goals in more general level give better insight of what should the future capabilities be. The technical side might even change depending on how and with what technologies the final solution is created with but the goals from customer perspective do not change.

Security roles

The customers of business intelligence consist of external users and the internal users. All are treated as customers or end-users. The same roles can be utilized with both internal and external users because what the user tries to achieve or should be allowed to do. Security role comes down to two different categorizing features:

1. Competency
2. Authorization

Competency is the measurement what kind of rights should the user have. According to their skill level they should have very limited user rights or very wide user rights. Limited user rights include only the things user has to see or be able to do while restricting the ability to query, modify the out of the box solution or modify things someone else has created. With ability to modify more, comes the responsibility of making sure nothing breaks.

Authorization is the second categorizing features of what the user should be able to do or see. Based on financial dimensions or the position in the company the user rights should be different. C-level users should obviously see all the information they wish but employees should see only their own business unit, country or data based on chosen dimensions. The same idea can be implemented both internal and external users. External users should see only their own company, but internal users could have similar restrictions. The internal user rights are based on the companies that they are working with, but the restrictions are still based on dimensions. Building customized content based on the roles makes it feel like more personalized while roles enable easier governance over users. Enabling self-service into some parts of the service will require ability for personal modification.

Multiple data sources

Combining multiple sources of data is a must for modern analytics. Business application data sources, sensor data, and external data must be gathered in the same place for further processing. So-called raw data storage should serve all the purpose-built solutions for analytics and reporting. Data from a single source does not fulfill the whole business need since e.g. the financial data from ERP should be combined with data that correlates with the results and tells reasons behind the figures.

Data in different stages should be stored in a suitable place depending where it is used or if the data should be further processed. While the data is analyzed or aggregated from the original form, the data must be stored in the processed form to be used for the purpose. The processing must be done in the correct way. The process should be reversible if needed. Having service on different levels of value chain means many different states. These states should be connected to find causalities.

Self-service capabilities

Self-service in this context means different things depending on the security roles. The idea of having multiple roles means directly different capabilities. In the most basic form, the self-service means that the user can filter and drill-down the reports. Self-service should have multiple levels depending on the role:

- Business user
- Advanced user
- Developer

Self-service expectations are different depending if the user is internal or external. For external users the service should be easy to use and straightforward. For the internal users there are more possibilities since the user does not necessarily expect the end-to-end service. Internal possibilities should be much wider since internal users are much more controllable.

This is because the same numbers are usually used but simple ability to change few fields of the report will be enough for some users. These are the read-only business users. For more demanding self-service users, the ability to modify existing data models should suffice. They can combine different data models or add external data into an existing one. These are the advanced users that have ability to create and modify. Developer status is only for internal user roles since they should have the ability to create new queries. This requires a lot more technical knowledge.

Near real-time

The data should be updated in intervals that are purposeful for that specific data. The transaction or modification that user does, should take place almost immediately so the user can see their own changes. However, some changes can be not so time dependent

and can be calculated for example once a day. Weekly or monthly reports do not change except when there are changes after the reported time period. The changes should trigger update for the parts that the changes are made to.

Near real-time updates are necessary where the data value diminishes, or the old information can cause problems. The ability to keep everything updated real-time does not mean everything should or has to be. The near-real time capabilities are extremely useful when dealing with dashboards and other dynamic tools. The static reports always have some delay and the expectations with them are not so high. For example, IoT dashboards however are expected to be real-time. The real-time aspect gives users the ability to react instantly to the changes.

Standardization

One goal was to gain more standardized service across business units and countries. By sharing the centralized information related resources to enable business units across the organization, the service level should stay on similar level. Standardization is good but in data and analytics, the needs are different, so all the way standardized solutions do not work for all customers. Different customers and different users need personalized analyzes and content. Based on the role, the self-service capabilities are different and so the level of standardization changes. The starting point may be same, but the outcomes vary from user to user. Figure 15 represents the change in level of standardization when the level of maturity raises:

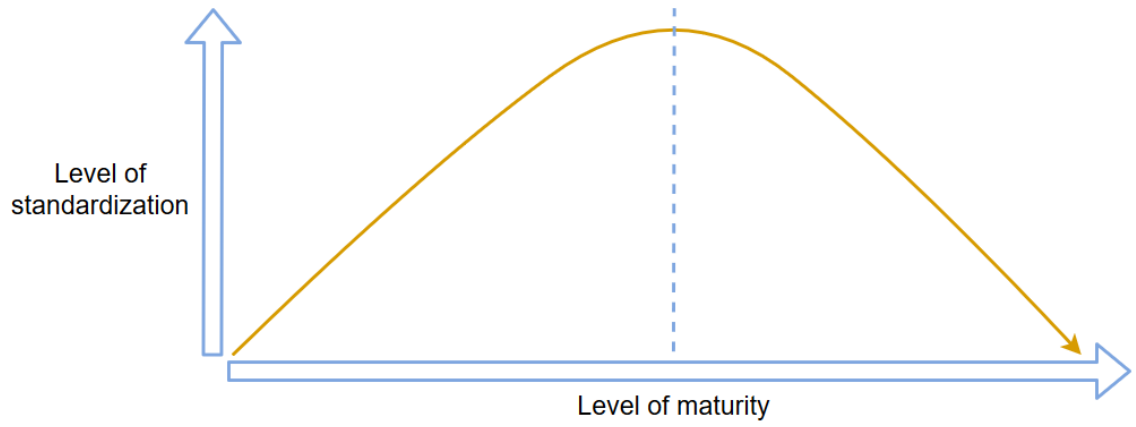

Figure 15. Effect of analytics maturity to the level of standardization

Higher level of standardization is achieved through higher level of maturity but in the end at the very top of maturity the standardization is low again because of the personalized content. The change takes place in other dimensions. With low maturity the low level of standardization is bad because of the chaotic governance. When the maturity is high, the low level of standardization should be governed and so the ability to create personalized content creates value.

Internet of Things

Company X is in the property management industry. IoT has a lot of potential with buildings concerning many aspects. Predictive maintenance based on sensor data or optimizing ventilation and heating are a few potential use cases for IoT data in property management. The goal is to gain efficiency or savings through analyzing the IoT data. IoT is dependent on a unique technical solution compared to transactional data from business application. Data comes in a constant stream and might require immediate response to changes which makes IoT services more complicated.

For the external customers this means lower price of the service or ability to measure and follow the development. Sensor data and the analytics from that data has potential from small properties to large ones but the most potential, and possible savings, are in the large properties. Adding data solution to assists in decision making unlocks potential that would otherwise be out of the reach.

Advanced analytics

Since the ability to deliver from the top of the analytics value chain is highly dependent of the organization's analytics capabilities. Some simpler use cases can be created with predictive analytics but the advanced analytics and the IoT are further in the roadmap.

Some use cases have been recognized. Predicting property value and cash stream were two of the predictive analytics use cases that could be the starting point to start utilizing the advanced analytics in the organization. Same as with the other solutions. These should be tested internally first before starting to offer the service to the external users. Having a large organization and a lot of data in addition to all the expertise to fill missing data by hand if needed is a big advantage.

Mobile

Scalability and the ability to use the services on mobile is important. Apart from being able to serve all the customer segments, the services should be available on the preferred devices and as customizable according to the customers' preferences. The main idea with mobile is that the availability and ease of use are in the focus. The ideology behind having a mobile service is tied to the different value it brings through the speed for example.

Mobile enables larger presence towards the customer by adding the option to the portfolio. It is again the ability to serve customer according to their preferences and minimizing the points of dissatisfaction of some customer segments. Mobile is not a top priority but when the user count rises, the mobile should be a part of the offered services.

7.3 Delivering customer value

Delivering customer value had two main points which are how is the value presented to the customer and what the value in self-service is. Communicating the benefits clearly and the tradeoff of the self-service and traditional service must be clear for the customer, so the expectations meet the actual delivery.

Communicating the customer value

Data and analytics are the main customer contact point in the day-to-day, weekly or monthly business. A report is always delivery of customer value. When the numbers are communicated to the customer, the value is realized since the customer might not be aware of the situation at hand before the weekly or monthly report. The financial figures must be communicated in a way that is preferred by the customer and creates the most value for them. Some of the big clients want their reports in a strict form so they can create their own analysis in their own systems, since the service company X provides to them is just a small portion of their overall business.

Offering the data in different stages depending of the customer needs is the key point when reporting. Some clients want the raw data, and some want aggregated data. The report can also be more consultative as it can include support for decision making for the client. Managing the portfolio has to be consistent so all the clients get the same service. The position of who creates the value for who must be established as either one can be the value creator for either one. In some cases company X tries to create value into the customers value chain and in some cases the customer creates the value into the company X's value chain.

Self-service benefits

Self-service model has some differentiating possibilities from traditional analytics services. The control over the data is important to some clients. Speed and ease of use are some of the main focus points why the customer would be ready to use their own time to create the needed value themselves.

When talking about self-service, the customer is taking a role in creating the value as the self-service can be offered in variety of stages. Service provider provides the data, platform, tools, expertise or some combination of those. The main idea is to shift some of the work from company X to the customer, so the company X's resources are not so highly affected by the peaks in service.

8. DISCUSSION AND CONCLUSIONS

In this chapter the theories are combined to create a bigger picture on how the different themes are connected and how do they affect each other. The relations and correlations are important when grasping the contextual nature of the value creation and how can the context can affect the viewpoint. The chapter 8.1 combines all the chapters of literature review and the empirical results introduced in the chapter 7. The research questions introduced in the introduction chapter are answered in the chapter 8.2. Chapter 8.3 describes what has to be taken into account while reading this thesis and in the chapter 8.4 the list of proposed future research is introduced.

8.1 Combining theories

Starting from value creation concept, the value should be created in different ways for different customer profiles. Value perception is the critical term when discussing about the psychometric properties of value (Sánchez-Fernández et al. 2009). When the value concept is realized, the framework to measure value can be understood. Combining the Holbrook's (1994, 1999) typology and Rintamäki's (2016) value dimensions, the new combined value typology is visualized in figure 16:

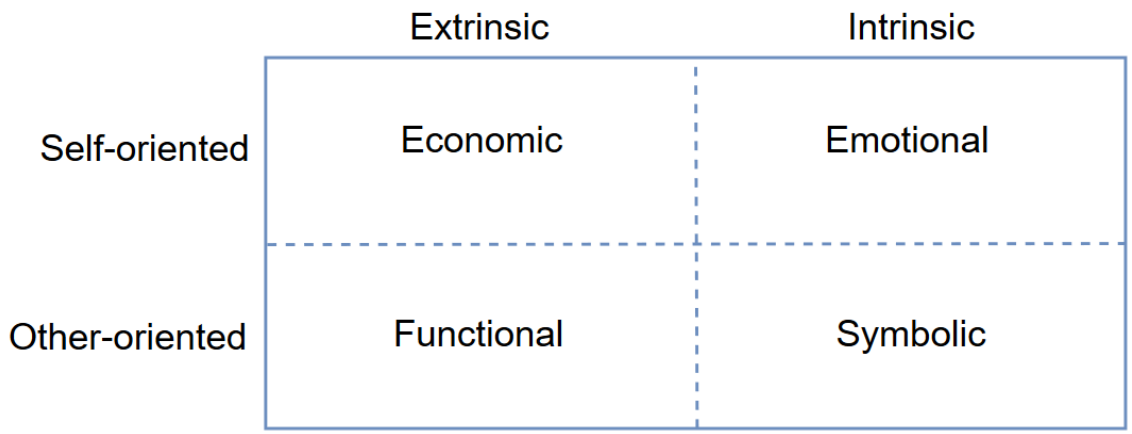

Figure 16. Simplified customer value typology (modified from Holbrook, 1994, 1999; Rintamäki, 2016)

The value dimensions of figure 16 still have the extrinsic – intrinsic and self-oriented – other-oriented nature (Holbrook, 1994, 1999). Also, the active – reactive value division observed by Holbrook (1994, 1999) is hidden inside a single dimension. The dimensions were introduced in the chapter three. Customer value is built by the different value dimensions. Each customer has their personal preferences about the services (Woodruff, 1997). The customer perceives the value in different dimensions based on the tradeoff between benefits and sacrifices that is combined with the personal preferences, standards,

rules, norms, criteria, goals, and ideal to get the perceived value (Parasuraman, 1997; Zeithaml, 1987; Woodruff, 1997; Holbrook, 1994, 1999, 2006). Customer value is a multidimensional structure where the value is created separately and simultaneously (Sheth et al. 1991; Park et al, 1986; Woodall, 2003; Rintamäki, 2016).

Analytics and self-service are tied to value creation by their nature. In the broader concept of dynamic capabilities, the same capabilities do not have to be analytics related. Taking into account the context dependence of customer value, the analytics maturity is divided into analytics capabilities. Analytics capabilities are either technology or human organization related. Infrastructure and life cycle are the technological capabilities, and vision, strategy, governance, metrics and organization and roles are the organizational capabilities. The concept of analytics maturity is introduced through analytics capabilities by Holsapple et al. (2014), Sharma et al. (2014), Chen et al. (2012) and others in the chapter three. Dividing the analytics value chain into where technological capabilities and human and organization capabilities should be utilized where the most value can be created. The division between potential value of capabilities is visualized in figure 17:

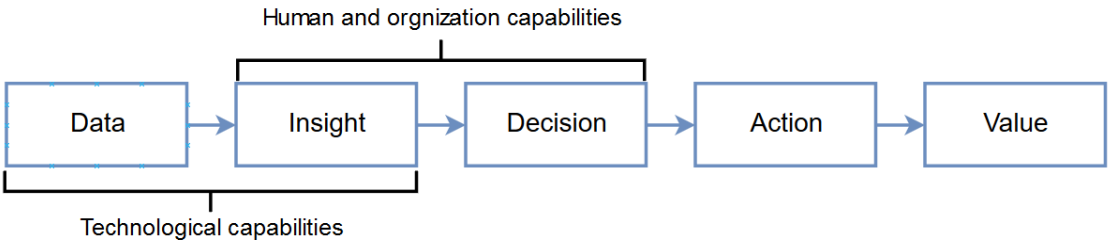

Figure 17. Analytics capabilities in analytics value chain (modified from Sharma et al. 2014, Seddon et al. 2017)

The existing capabilities should be leveraged in the processes where they can be most useful. Data-to-insight process has the highest volume of data and the technological capabilities should be focused on data and insight stages of the value chain (Davenport & Harris, 2007). The value is created by lowering the need of analytics professionals by using technology (Shanks et al. 2010, 2011; Shanks & Sharma, 2011) with the efficiency and processing speed of technology. Human and organization capabilities should be focused on the insight to decision process (Sharma et al. 2010; Lycett, 2013). Insight is already in a more understandable form than data. People can use insight for better decision making. Improving the decision-making process with technology is a lot harder than data to insight process because there are no clear rules what insight should be included when making decisions (Sharma et al. 2014). Creating good quality decisions cannot be automatically improved by adding more features to the process. The service context (i.e. the stage in the value chain) is the deciding factor on what kind of value it creates. From purely analytics perspective, the value grows incrementally and cumulatively as the process progresses in the value chain.

Self-service differentiates the value proposition from the traditional analytics value proposition. The value of the self-service is instantly realized after the service has served its purpose. The value chain introduced by Sharma et al. (2014) and Seddon et al. requires that the value chain is progressed through completely for the customer value to be realized. Self-service data can be similar to data as a service, but customer has to be readier to co-create value with self-service. If the data as a service is defined as service from where the customer can extract the data, then self-service data & analytics is a platform where customer can co-create value. Customer value perception affects if self-service seems feasible for that customer (Grönroos, 2011). In value co-creation the customer allocates resources to create value for possibility of enhanced value from the data (Gupta & Lehman, 2005). The benefits and sacrifices of the self-service must be in balance (Martin et al. 1999). The self-service value chain is visualized in figure 18:

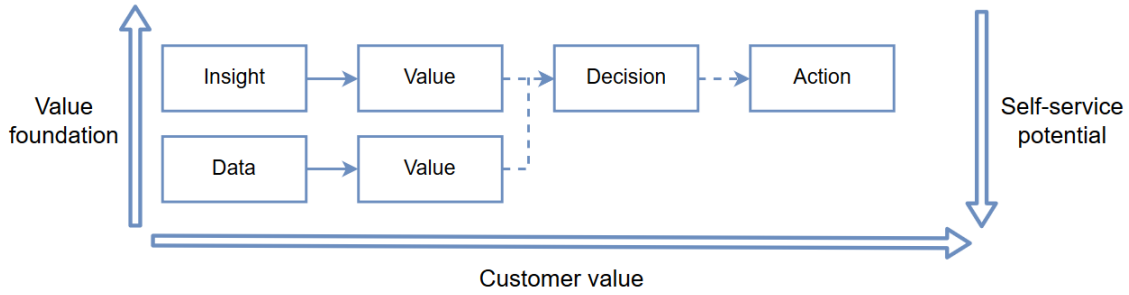

Figure 18. Self-service analytics value chain

In the figure 18 the value foundation is offered by the service provider in the form of data or insight. The value of the service is realized immediately as self-service is focused around the technological capabilities. The value that the customer tries to achieve with the service is already modeled or simply available in the self-service as they are the mediators of self-service. (Davis et al. 1989; Meuter et al. 2003). The customers then have to co-create the value with the service provider (Grönroos, 2008) or create the value themselves independently. According to Bateson (1985), Dabholkar (1996) and Schneider & Bowen (1995), customer is more like to perceive the intrinsic value in the self-service because they have active role in the process. Self-service value is also from the self-oriented mediators of accomplishment, prestige and personal growth because the customer can have bigger impact on the results (Becker, 1970; Rogers, 1995).

8.1.1 Analytics value proposition

The results of empirical research presented in the chapter 7 are combined to the theory related to analytics and the value creation possibilities around analytics maturity. The analysis of this chapter revolves around how analytics can create value and what should be the focus areas to be developed in the future. The literature review can be combined to the empirical research results from many angles, but the value creation perspective is the best way to find the critical areas as everything cannot be acknowledged here.

The case organization tends to start developing the capabilities from technology perspective because it is the first step in the analytics value chain. It makes sense since the data stage is the first and without data, the rest of the value chain process cannot progress. The vision of the future is thought in the company X but it is based on the technology perspective. Infrastructure and life cycle were discussed in the group interviews, but strategy, governance, metrics, and organization and roles were not discussed in depth. This was a mistake from the researcher also. Understand, developing and utilizing all of the dynamic capabilities enables the overall management and performance enhancement. Management has to include the human and organization capabilities as the focus point of development. Without the human and organization capabilities, the technologies are forced on processes and people that are not ready for the change. The technological capabilities on the other hand were discussed and agreed on in the workshops.

Some of the discussed technologies are high on the needed analytics maturity. The single use cases can be implemented as a service even the human and organization capabilities are not so high. The target state of analytics capabilities also indicates the company X is readier for the technological changes. Enabling multiple data sources, real-time data, IoT and mobile solutions in the data and insight stages are more technologically dependent and these should be easier to manage for company X than the decision-making related future directions. The target states of the different analytics capabilities should grant fairly high level of maturity, once the target states are achieved. Especially the metrics that are used to measure the difference between goals and what was achieved helps to create more efficient ways to improve the business and the capabilities.

Higher maturity enables higher differentiation in the analytics portfolio. Different analytics value propositions can be combined into a portfolio of services. To make sure that right kind of services are offered to the customers, the value propositions should match the different customer profiles. As different customer profiles should be linked into business problems, the different services should aim to solve these business problems. Because business analytics is process-oriented, the different touch points with the customer must be observed and the services should be embedded into the processes. The service then has use cases tied to processes and business problems. To gain the interest of the customer, the value of different services must be communicated correctly. Company X has wide variety of customers from B2C to B2B ranging from small business to large corporations. Therefore, the needs and processes with them vary a lot. There is no way that a single standardized service is enough as the customers need help with different stages of the value chain. Improving the different capabilities helps the company X to make sure than they can support the customer on all the stages of the value chain.

8.1.2 Differentiate with self-service

As the thesis focuses on the value creation aspect in general level, the self-service capabilities and possibilities are looked at in the context of how self-service analytics create

value. Also, a bit of comparison of how self-service differentiates from the more traditional analytics services. The empirical results of self-service related topics are combined to the literature review to gain more in-depth knowledge about the self-service.

As the company X's customer profiles vary a lot and the property asset management industry is outsourcing itself, the customer might adopt the self-service model more easily. The technological capabilities are the focus for the company X and the technological side is important when creating a self-service. Because of the value-based approach on analytics, self-service is a great way to deliver the value faster. As the value chain is considered to start from the value, the process and the business problem, the data aspect is there to solve the issue and deliver the value. The self-service has already served its purpose when the customer uses the service as the customer is enabled to make insight from data or decision from insights. Shortening the value chain gives more opportunities for both parties. The service provider can deliver services to wider variety of customer profiles and the customer can choose a combination of services. Customer might still use the raw data extraction to feed it in to their own systems but utilize the self-service insights because of the service providers' capability to create insights. Decision-making quality is highly dependent on the insights. The more data the service provider can shape into insights, the more value the self-service has.

Self-service is also dependent on the technologies and tools provided by the service provider. Self-service is collection of modeled use cases into a standardized form to be used in a non-standardized way. Since the processes that the service is tied to, remain standard but users can utilize them in any way because of the nature of self-service. The control over the data and the speed for ad-hoc needs cannot be matched against a self-service as the customer can extract the needed insights from the data whenever. The service itself has to be easy to use and reliable to get the users to keep using the self-service. If the customer has to return to use the interpersonal service, the self-service adoption will be hard compared to customer perceiving the marketed value. The developers, analytics professionals and the business managers will all have to sit down to discuss about how the service, models and business problems fit together. Self-service designed by analytics professional alone will not be optimal as each person from different units inside the company X has ideas how the self-service could create value.

Advanced analytics use cases can be enabled use case by use case if the processes and problems are too complex to have advanced analytics as embedded part of the processes. Single use cases as a separate services can create similar value but they are easier to manage. Pretrained models enable advanced analytics as self-service since the user only must give the inputs and the service gives the output accordingly. Offering the more complex services enables customers to gain different kind of value from them. The customers themselves are not capable of creating such analytics or they simply do not have enough data to have successful models. The value from these services might be more appealing to them. The lower level analytics could be well managed by the company, but they might

not have neither skills or technologies to execute advanced analytics as a part of their processes.

8.2 Summary and conclusions

The primary objective of the research was answering the research question. The question topics revolve around value creation or value perception with different analytic methods and services. The literature review answered the research questions from the theory perspective. Empirical research was conducted to fit the theory into company X's case. The literature review and empirical research together answer the research questions:

How is customer value perceived?

Customers perceive the value differently because their values are different. Value is the tradeoff between benefits and sacrifices. The tradeoff can be calculated in multiple ways, but the main idea is that something must be sacrificed to gain the benefits. Positive value perception happens when the benefits are bigger than the sacrifices. The perception is based on the subjective values each person or organization has. The perceived value is gotten when the personal values are taken into account when looking at the value of the service. Value perception is the critical term when discussing about the psychometric properties of value.

The framework on this thesis had four dimensions which were economic, emotional, functional and symbolic. Each of the dimensions is positioned in either intrinsic or extrinsic perspective and in self-oriented or other-oriented perspective. Evaluating yourself in the customers business allows you to evaluate what kind of dimensions and perspectives the customer is looking to achieve from your services. Value is created same time in multiple dimensions. Measuring value must be done in known context to be able to measure the created value.

Different customers profiles prefer different dimensions of value over others. Sacrifices are usually based on the resources given up. These resources are most likely money or time. With self-service the other than economical dimensions have more potential since the customer is in a bigger part of the process and the self-service has potential to create non-monetary value that might later be translated into monetary value. Self-service value perception is usually around the intrinsic and self-oriented perspectives. Value co-creation has elements that the customer might perceive more valuable than purchasing the whole service. The value perception remains contextual and has to be analyzed within the known context by analyzing the customer profiles.

What is the self-service analytics value chain?

In this thesis the self-service analytics value chain follows the analytics value chain. Self-service model adds some features to the original value chain. As the value foundation

goes up, the self-service potential goes down. The self-service potential is highest when the data is in the raw form and customer can either create the value themselves or co-create the value with the service provider. The value of self-service is realized much faster since the goal of a self-service is not necessarily to cover the whole value chain. For example, self-service offering just the raw data has its value realized once the customer simply gets their hands on the data. The infrastructure, data models and tools might be a part of the self-service as capability to process the data is important part of the self-service model. The value of self-service is based on the key mediators. In the analytics context the most valuable mediators are speed of delivery and self-control. Using the service creates value when the service is easy to use and reliable. The cost savings in the context of value creation is discussable since different users might see different value in the service.

Self-service has two ways to create value. The value is either co-created with the service provider where the service provider sets the value foundation and offers the platform. The other way is to enable customers to create the value themselves by offering the data or insight in the different stages of the value chain. The choice between letting customer create the value themselves or have them co-create is dependent on the capability to offer the necessary foundation and platform. So instead of going through the whole value chain for the value the to be realized, the customer chooses from the available self-services at what form they want the data for their own processes.

How does analytics maturity affect analytics value creation capabilities?

The analytics capabilities consist of seven different capabilities, but they have been split into two decisive categories in this thesis. The first is technological capability. The second category is human and organizational capability. The first category represents technology aspect and the second one more of a management and business aspect. A single capability does not directly enable or disable the ability to deliver a service, but the capabilities together form the analytics maturity. The higher the maturity is, the higher the capability to manage information assets is. High maturity enables effectively managing the whole value chain which means that the most complex processes are managed and the potential to create customer value is higher.

Being able to handle the whole value chain gives the potential to position yourself into the customer's value chain by delivering services that the customer is not capable of producing themselves. This makes the service provider an important asset to the customer and enables repositioning in the customer's value chain. This depends highly if the service provided is a self-service, professional service or combination of these two. Technological capabilities create the most value in the start of the analytics value chain where the need for processing power is the biggest since the volume of data is highest. Human and organizational capabilities are more suitable in decision-making process because the data or insight needed to make a good quality decision is not fully known.

How does self-service analytics create customer value?

The primary research question can be answered by combining all the other answers to research questions. Self-service analytics creates customer value based on the self-service analytics value chain, analytics maturity and value perception. Analytics maturity defines what kind of services the organization is capable of offering. Different self-services have different value propositions as they are designed to solve different business problems. By assessing the maturity and the customer profiles, the value propositions can be matched with corresponding customer profiles. The value propositions must be communicated well to the customer, so the customer expectations are as close as possible to the perceived value from using the service.

As the customer value and customer value perception are contextual, the benefit of self-service model is a way to widen the analytics portfolio that consists of the different value propositions. Shifting some of the work to the customers in the self-service model, creates non-monetary value for the company as co-creation offering insights about the customer needs. The value is created either through co-creation or through selling the data for the customer. For the customer, this enables the possibility to choose. The value of the self-service for the customer comes from the different features that remove the initial dissatisfactions in the original service such as speed or control over the data. If the interpersonal service has a lot of points of dissatisfaction the potential customer value from self-service is bigger.

8.3 Critical evaluation

The thesis has to be critically evaluated when reading the conclusions created based on the empirical research and the literature review. The subject has not been widely researched. The timeframe to conduct the empirical research and to deepen researcher's knowledge on the subject was short. The researched topics covered multiple themes and the theory part had to be translated into concrete guidelines. Considering the following issues will help the reader to critically evaluate the results of this thesis.

Each of the three topics covered in the literature review could have been the whole focus of the thesis. However, because of the lack of the actual solution, the smaller aspects could not be studied closer. For this reason, the jump from literature into conclusion might feel big since all the aspects of each topic could not be included into the literature review. The literature review consists the necessary chapters to derive the conclusions. All the scientific sources are peer reviewed or cited in other researches and the market analysis references are from well-known providers to gain more timely articles.

The solution discussed in the thesis does not exist yet so everything about the solution is conceptual. The context is important to take into account as the value perception is highly

subjective matter. The conceptual and contextual aspects make the thesis more theoretical. The conclusions are not observed results on how the value can be created for customers but rather guidelines on how to proceed on designing the future solution, so it will serve its purpose. Where this thesis meets its shortcomings should be evened by following the future research as they can take the context better into account with more information about the customers and the solution.

Empirical research was done with surveys and group interviews. Sample size of the respondents is small as the research was qualitative case study with only one case company. The participants for the surveys and group interviews are all employed by company X as the results are directed straight for their purposes. The requirements are based on the participants' view of what is the target state. People tend to cling on to what they have done earlier or what others have already proven to be effective. Participants are making sure that the smaller requirements that are important to their own work are taken into account, instead of innovating the solution as whole. As the surveys were answered with one set of answers for each country, some of the ideas might have been lost in the process as the different business units inside the countries have had to summarize their opinions into one answer. Same issue is with the workshops as the participant might have been afraid so say the boldest ideas out loud. The credibility is still strong as the group interview participants did know each other and the conversation was open during the group interviews. Actual innovation on the topic would require a different approach and not just aim to gather the requirements for the future solution.

Empirical part of the research had four different countries attending. The different countries have earlier been their own companies as the company X has grown through acquisitions. Their visions for the future can be quite different and the level of generalization can be quite big when forming just one opinion from four different opinions. The purpose is eventually to create one way to serve the customer, so the customer service stays consistent even over the country borders and is non-dependent on the serving employee. All the results are even further generalized on the empirical results, so they can be linked to the literature review more easily.

As the points of critical evaluation are considered while writing the thesis, they are somewhat taken into account to try and stay as subjective as possible while writing the thesis. The group interview participants are experts in their represented field and there is no reason to doubt their expertise too much. Critical evaluation is part of the scientific research. The thesis describes one possible approach to the given problems and does not rule out other approaches. The approach of the thesis should be evaluated while following it.

8.4 Future research

As mentioned before, the future solution is only a concept. Future research is needed on the solution itself as well as from the marketing and sales perspective to be able to deliver

right solutions for the right customers. Technology adoption is largely based on the first opinion of the new solution so marketing efforts should be directed towards the customers that see potential and value in that specific solution. The frameworks and guidelines introduced in this thesis are designed to aid in the future research. Following a full cycle of the customer value management framework by Rintamäki (2016) is needed in the future. The customer value management framework by Rintamäki is transformed into linear model since the initial need to cycle through it once. The linear value management framework is visualized in the figure 19:

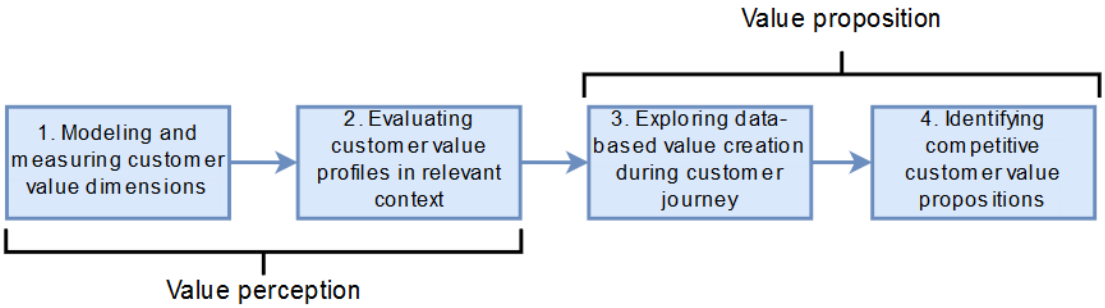

Figure 19. Customer value management process (modified from Rintamäki, 2016)

The value dimensions must be chosen, and the customer value structure has to be created. The model in this thesis might act as a guideline to value-based customer profiling to evaluate what kind of different customer profiles does the company X have based on customer value perception. Different customers try to get different value from the data and analytics services. Evaluating how many different kinds of profiles there are is important to understand how the customer might perceive the value. Then the customers are placed into the segments based on their profiles. There might be other than value-based similarities inside the segments or between the segments, and these similarities should be investigated.

Investigating the customer journey and choosing what kind of services could be offered as part of the analytics value proposition. Assessment should be done based on current analytics capabilities and creating a roadmap for the future. The analytics value propositions should be focused on the services that can be managed effectively. The roadmap should include technologies and organizational skills needed for the future need of the customer and vice versa. Capabilities can be developed but the focus should be on business problems and solving them. Effectively attaching and solving problems that could be solved by data-driven decision making is a priority over developing the capabilities to try to enable a conceptual service that might solve problems.

The last identified part is the value proposition for the service. The competitive advantage has to be marketed in a way that the customer understands why they should commit to the service and what is the value in the service. The value proposition should be suitable for the identified customer profiles. Different stages of the analytics value chain or self-

service model offer very different value propositions. The analytics portfolio should be built based on what kind of services the organization can deliver and the development should be based on the customer needs. Being capable of offering services to all the different customer profiles, is the ultimate goal.

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APPENDIX A: SURVEY QUESTIONS INTERNAL CAPABILITIES

1. List user count
    a. Country and position
    b. Read/modify/create rights
2. List the business intelligence capability requirements
    a. Written description of the requirement
    b. Priority
    c. Person responsible
    d. Comments

APPENDIX B: SURVEY QUESTIONS EXTERNAL CAPABILITIES

1. List user count
    a. Read/modify/create rights
2. Capability requirements for tool/service
    a. Written description of the requirement
    b. Priority
    c. Person responsible
    d. Comments
3. List client user groups

APPENDIX C: SURVEY QUESTIONS INFRASTRUCTURE

1. Data sources
    a. Purpose of the system
    b. Technology
2. Data migration
    a. Data source
    b. What kind of data (e.g. financial)
    c. How many years worth of data
        i. Transactional
        ii. Aggregated
    d. Estimation of the amount
3. Data
    a. Estimation of the amount data created each month
    b. Data formats (e.g. pictures, audio)
4. Performance
    a. How many years of data hot/cold storage
        i. Hot storage: day-to-day reporting
        ii. Cold storage: longer time span reporting
5. Updating
    a. Data update intervals
        i. Minimum
        ii. Maximum
    b. What data has to be updated more often
6. User rights
    a. Requirements for row-level security
    b. Responsible for maintaining
        i. User access
        ii. Roles
        iii. Restrictions

APPENDIX D: SURVEY QUESTIONS FUTURE OF BUSIENSS INTELLIGENCE

1. Changes you would like to see in capabilities
    a. Main benefits of these changes
2. Customer requirements for the future
3. How to utilize data-driven decision making in the future
    a. Internally
    b. Externally
4. What capabilities should be enhanced in order to create better functioning business intelligence
    a. Personal development
    b. Organizational development

APPENDIX E: SURVEY QUESTIONS ANALYTICS CAPABILITIES

Analytics capabilities evaluation: seven categories of capabilities evaluated based on written descriptions in a scale of 1-5. The categories and the written description for each level is presented in the Appendix F.

1. Vision
2. Strategy
3. Metrics
4. Governance
5. Organization and roles
6. Lifecycle
7. Infrastructure

8. APPENDIX F: ANALYTICS CAPABILITIES MATURITY MODEL

Table 4. Analytics capabilities, Vision

Level	Indicators	Target
Level 1: Aware	Information is a source of power, but managed in silos. People spend time arguing about whose data is correct and who owns it instead of seeking uniform availability. There is general acknowledgment that information management (or lack thereof) is a serious problem.	
Level 2: Reactive	IT attempts to formalize objectives for information availability to achieve targeted operational needs. Progress is hampered by culture, contradictory incentives, organizational barriers and lack of leadership.	
Level 3: Proactive	Business management encourages cross-functional information accessibility to improve responsiveness to the business, customers and marketplace. Different content types still are treated and managed separately. Data fiefdoms begin to disband. Exogenous data sources begin to be integrated for enhanced analytics.	X
Level 4: Managed	Senior business executives champion and communicate information-related best practices. Information is viewed as an indispensable fuel for enterprise performance and innovation to be shared seamlessly. Customers and partners influence information vision. Information assets are linked and leveraged across several programs.	
Level 5: Optimized	Information is a central component of business strategy and architecture. Information is a recognized corporate asset, competitive differentiator, source of transformation, and even as a product itself. Necessary, valued and prioritized information is leveraged across all programs and investments.	

Table 5. Analytics capabilities, Strategy

Level	Indicators	Target
Level 1: Aware	Information is hoarded by departments and individuals as a source of power and influence, or is unknown altogether. Information is seen merely as application-specific. An information management organization may be in formative stages, but sponsorship is nonexistent.	
Level 2: Reactive	Business units recognize the broader value of information and begrudgingly share it on crossfunctional projects. An EIM organization emerges to establish and control standards, and improve information availability while reducing expenses, but the main focus is on technology.	
Level 3: Proactive	A high-level sponsor (e.g., CDO) is named to define an enterprisewide information strategy and coordinate a broad agenda, including funding and roadmap. Information management resources and technologies start to become pooled and shared across projects. Strategy definition is shifting from a static, annual process toward more of a dynamic "living document."	X
Level 4: Managed	A well-funded and well-led information program addresses most enterprise needs (current and planned). Business units are committed and involved. Most components and resources are in place and functioning. The office of the CDO is empowered to drive EIM vision in support of the business needs.	
Level 5: Optimized	Data and analytics leadership has a say in corporate strategy as information is deemed an actual corporate asset. Information is defined primarily by the value it brings, not by its structure or other characteristics. Business informational needs and risks are met proactively. The information strategy considers the organization's extended ecosystem of partners, suppliers and customers. Information strategy is no longer a separate work task but is embodied in how the business operates.	

Table 6. Analytics capabilities, Metrics

Level	Indicators	Target
Level 1: Aware	Any goals and measures for information management and delivery are purely subjective and rarely, if at all, tracked. Information management is not a budget item and priorities are based on influence peddling and failure prevention.	
Level 2: Reactive	Simple (often predisposed) costs/benefit models justify independent information management investments, or are merely part of IT-business projects themselves. Priorities are based on user surveys, minimizing each information management program expense, and infrastructure performance/scale. There is a proliferation of nonfinancial metrics.	
Level 3: Proactive	Information management financial justifications for each investment are typically related to expense savings, or embedded in other projects. Qualitative measures emerge for information management that may not necessarily link well to business KPIs. Some data profiling is done for tactical purposes, usually only for specific data quality needs.	X
Level 4: Managed	As EIM becomes a budget item of its own, various measures of information value (e.g., quality, top/bottom line) and risk are developed, tracked and communicated. Some information metrics are linked to business initiatives, and business cases are linked. Feedback loops reporting information value and investment yield emerge.	
Level 5: Optimized	A portfolio approach to EIM investments and risks is adopted wherein business cases are aligned and interrelated. Information valuations and yield (e.g., ROI) models drive investments in information, technology and business innovation. Information-related metrics correlate to business value metrics.	

Table 7. Analytics capabilities, Governance

Level	Indicators	Target
Level 1: Aware	Few official policies exist for the handling or use of most information, other than those required by law and industry regulations. Ad hoc data quality efforts and a lack of data definitions result in low data trust and usage.	
Level 2: Reactive	Policies, mostly for information silos, have emerged for information management and use but are not monitored and are regularly circumvented. Information owners are assumed and upstream data quality is performed as needed.	
Level 3: Proactive	Policy adherence procedures for key information assets are developed and monitored by information owners and stewards who have limited authority. Formal data quality/integration, metadata and MDM programs emerge, but they tend to focus on small subsets of business data or business outcomes to be improved. Efforts to align governance and stewardship of different kinds of data, spanning content and structured data, start to emerge.	X
Level 4: Managed	An enterprise information governance organization is functioning (e.g., within the context of the office of the CDO) and carries sway on all IT and business projects. Policies evolve into a full set of precepts (e.g., principles, guidelines, policies, standards, procedures) which are well communicated and enforced. Data quality is largely automated. Information governance priorities are based on business need, not IT demands. Information security and risk are now linked to the same information governance process.	
Level 5: Optimized	Enterprise information governance is encoded into an automated information asset management system. Business process improvement is now part of information governance. All information assets, including external sources, are inventoried. Information stewards have become *information advocates*, focused more on fostering information value generation now that data quality has become part of the culture.	

Table 8. Analytics capabilities, Organization and roles

Level	Indicators	Target
Level 1: Aware	Information-related responsibilities are resourced on an application-by-application and projectby-project basis. Business people typically are resigned to source and manage their own data, or must join the IT backlog.	
Level 2: Reactive	Pooled or centralized database administrators, data administrators and data modeling resources emerge, all of whom are strictly part of the IT department. IT also houses business intelligence analysts and data integration specialists. Business users are engaged in information-related activities mostly to resolve issues, rather than in upfront design and planning.	
Level 3: Proactive	Formal information and content management organizations materialize within IT and governance councils and stewardship bodies in the business. At least one data scientists is hired by a business unit. Projects are set up and staffed one at a time, but tend to lack a plan for organizational continuity or intraenterprise synergy.	X
Level 4: Managed	EIM and analytics move outside of IT as a CDO is installed to lead a separate enterprise information services organization. Specialty roles — such as big data infrastructure/architecture specialists, data scientists, information strategists, information architects, information product managers, and data curators — become prevalent. Information-related competency centers emerge under the CDO for core analytics, data modeling, metadata and master data.	
Level 5: Optimized	The CDO oversees and has authority and budget for most aspects of the information life cycle. This information services organization supports the entire LOB-customer-partner-supplier information ecosystem. Data-related meetings have become business-centric. An information product management function develops and facilitates new revenue streams.	

Table 9. Analytics capabilities, Lifecycle

Level	Indicators	Target
Level 1: Aware	There is no understanding of information having its own life cycle. Data is kept and maintained in silos and IT does its best to integrate data as requested. Usually this involves making data extracts. The focus, if there is one, is on local efficiencies and use of individual datasets. Data is deleted early due to lack of infrastructure, resulting in potential regulatory violations.	
Level 2: Reactive	Data integration is effective in linking disparate data, but efforts to semantically align and form shared procedures across silos are sporadic. Metadata management is mostly manual (e.g., spreadsheets) and remains focused on individual data assets. Technical efficiency is deemed more important than the business efficacy from shared data. Data is retained well beyond its usefulness and may introduce risks.	
Level 3: Proactive	Information flows are well-documented, but not maintained. Metadata standards, tools and procedures emerge. But valiant attempts at enterprise metadata management are less than successful. Only some information governance policies are encoded as procedures. Information architecture is not yet formalized or embedded in the EIM program. There are still no enterprise policies or procedures for information disposal or archival.	
Level 4: Managed	Enterprise metadata management and master data management are ongoing initiatives that help coordinate and enable business initiatives. Semantically consistent and important information assets are shared across all needed programs and investments. Information architects are often involved in EIM but are less than central to, or sufficiently influential on, such efforts. End-of-life procedures for information assets are established only for those subject to industry regulations. Information is governed outside the control of any given business application.	X
Level 5: Optimized	Information architects are embedded in (and key players in) the EIM program. Information life cycles and metadata are documented, implemented and aligned — and all differences are culled as a matter of course. New information uses build on previously deployed and documented models spanning the information life cycle. Information life cycles are seen as business processes, not as IT workflows or tasks. Information value and governance are measured, monitored and optimized across critical information life cycle paths. Enterprise procedures are in place for the *defensible disposal* of information assets based on value, risk and compliance modeling.	

Table 10. Analytics capabilities, Infrastructure

Level	Indicators	Target
Level 1: Aware	Information management, storage and processing capacities are overloaded and almost entirely application-specific, leading to strategic business compromises and catastrophic mishaps. There is significant redundancy of tools and technologies, along with a prevalence of shelfware.	
Level 2: Reactive	Information infrastructure limitations and/or enhancement backlogs perceptibly inhibit business performance. Information silos limit business interoperability both internally and with business partners and customers. IT spend starts to "spill over" as business units invest in their own tools in reaction to information infrastructure weaknesses. There is no enterprise data warehouse, but there are many unmanaged data extracts. Applications are integrated, but semantics are inconsistent.	
Level 3: Proactive	Information infrastructure and operations capabilities and expenses are planned and support known business needs. An inventory of tools and technologies is maintained. Separate operational, content and analytic environments (e.g., data warehouse) now exist. Most technology acquisition decisions are made independently with a focus on tools, not solutions. Efforts to integrate data warehouses tend to focus on constructing a single analytic data structure.	
Level 4: Managed	A purely centralized information infrastructure has given way to integrated, standardized, extensible, and IT-supported LOB environments. Some use of cloud storage and processing enables improved expense management and dynamic capacity. Logical data warehouses and data-as-a-service architectures are developed. Enterprise MDM, EMM and information governance and stewardship solutions are deployed broadly. Information management solutions, not tools, are central to infrastructure investments.	X
Level 5: Optimized	The information infrastructure is dynamically elastic, relying heavily on cloud capacity. Big data, advanced analytics, enterprise content and collaborative decision systems execute on purposebuilt platforms. Infrastructure capacity and components are shared across business units and even some ecosystem partners. Information management capabilities, no longer solutions or tools, are the focus of infrastructure investments.	